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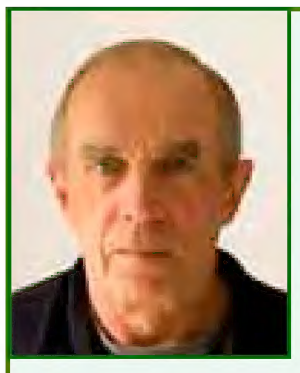
Editorial



Welcome to the latest edition of the Pteridologist. You will notice some changes in this magazine. I have taken advice from my printer and changed the layout slightly and the fonts. The biggest change is that I am no longer publishing contact details for all authors. You can look them up in the membership list or you can contact me and I will arrange for the author to contact you.

What a strange year this has been. The lockdown because of the corona virus has meant that a lot of gardens have been getting far more attention than normal. There have been no field meetings or A.G.M. The committee have been using Zoom for their meetings and the pace of life seems to have slowed down.

Facebook is being used far more and there are a few fern groups available now. Tim Brock started off the *Asplenium Scolopendrium* fan page, Ian Unsworth formed the *Athyrium filix-femina* cultivars group and Mark Border formed the *Polystichum* Group. Next on the scene Andrew Harrison formed the *Dryopteris* species and hybrids group, and this was followed by Julian Reed with his Polypody cultivars group (what else!). Have a look, you might be tempted to join them.

I have had plenty of time to put the magazine together but there is a recurring problem with some of the contributions. Images are an important part of this magazine. They should be sent as attachments, not embedded into a Word document because they lose definition. The text should indicate where the images should be going using Fig. 1. etc. and the images should be numbered accordingly and provided with captions. I cannot possibly guess which image goes with which caption unless it is very obvious. I am not a mind reader!

Again, there is plenty in the magazine to suit all members. Hybrids and cultivars are well catered for. Rolf Thiemann seems to be an expert on creating hybrids. We have news of ferns from Japan, a rare hybrid from Croatia, a fern tour of the northwest of the U.S.A. and a look at xerophytic ferns grown in the south of France.

Thank you to all the contributors who managed to send their articles well before the closing date of the end of February . There were still a few latecomers. I urge you all to stick to the deadline

Alec Greening

(alec.greening49@gmail.com)

Preview

Front cover: (above)
Woodwardia unigemmata

Photo: Ruth Piearce

Back cover:(right)
Based on this image of *Dryopteris filix-mas 'Bolllandiae'*

Photo: Martin Rickard

Notes for contributors
Ideally I would like contributions by e-mail or on disc or USB stick (which will be returned), with high resolution images.If this is not possible I will not rule out typed or hand-written copy. In general please follow the style of material in this issue.

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PTERIDOLOGIST 2020

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Athyrium filix-femina 'Barnesii'

Photo: Ian Unsworth

Macramé anklet
Photo: Franzi Holz

Unless stated otherwise, photographs were supplied by the author of the articles in which they appear

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Bulbils on *Polypodium vulgare* 'Cornubiense' types

Julian Reed

This is what Charles Druery said about Cornubiense and its bulbils in the British Fern Gazette in 1915.

> The latest find of this type was made by our member, Mr. W. R. Roberts, as a quite tiny plant on a dry hedgebank at Barnstaple. This was kindly sent to the writer, who grew it, and was for some time led to the belief that at last we had a constant form, as some twenty fronds it bears three names—" cornubiense," indicating its Cornish origin and therefore appropriate ; " elegantissimum," rather too superlative as it turns out, and " Whiteii." This last is derived from the name of one of its discoverers, three of which were apparently necessary for such an unique discovery. This name, however, was only temporarily applied or is rarely used nowadays. Besides the peculiarities already described, the fern is additionally interesting as a producer of dorsal bulbils on the more dissected fronds under favourable cultural conditions, but our own attempts to raise from these have so far failed. These bulbils appear in conjunction with the spore heaps, a rare but not unique phenomenon. The inclusion of such a variety among the elite is, therefore, seen to be fully justified despite its eccentricity.
>
> Chas. T. Druery, V.M.H., F.L.S.

The present Cornubiense is x *mantoniae*, a cross beteen *Polypodium vulgare* and *Polypodium interjectum*. I have never seen bulbils on this, but what was then called *Polypodium vulgare* 'Cornubiense' is what we now call *Polypodium vulgare* 'Elegantissima'; most are the intermediate form as they usually produce three types of frond: normal, divided and very divided. A few years ago I selected a nice form from Neil Timm's nursery and it is a finer form which looks much like the Jones nature prints and makes bulbils happily,as do most of the 'Elegantissima' that you see around.

Bulbils are usually found on plants grown in a greenhouses or very favourable situations outside. The following varieties I have found carry them.

'Elegantissima' (Fig. 1)

'Trichomanoides Backhouse' (Fig 6, No. 5)

'My Precious' (Fig. 7)

'Cornubiense Grandiceps Group'* (Fig. 8)

Fig. 1. *Polypodium vulgare* 'Elegantissima', the parent of the bulbils

Fig. 2. Dissected out bulbil

Fig. 3. Bulbils placed on compost in 2016

Fig. 4. Showing the growth of the bulbils in 2018

Fig. 5. Bulbils grown on in 2019

Fig. 6. A selection of Cornubiense types

1. *Polypodium x mantoniae* 'Cornubiense' - outdoor grown, small frond.
2. *Polypodium vulgare* 'Parsley'
   raised by Bob Brown of Cotswold Garden Flowers - greenhouse grown
3. *Polypodium vulgare* 'Elegantissimum' - greenhouse grown.
4. *Polypodium vulgare* 'Elegantissimum'
   spore raised by Niel Timm of The Fern Nursery Binbrook - outdoor grown
5. *Polypodium vulgare* 'Trichomanoides Backhouse'
   distributed by Backhouse of York in the 1873 - indoor grown
6. *Polypodium vulgare* 'Cornubiense group'
   raised by Robert Sykes - outdoor grown

Fig. 7. *Polypodioum vulgare* 'My Precious'

Of the finely cut *vulgare* types I suspect the form 'Parsley' will do this as well, but I do not recollect seeing it yet.

Martin Rickard told me ages ago that no one had got the bulbils on *Polypodium vulgare* 'Elegantissima' to grow. I have not yet tried this one, so choosing my best developed form I used a scalpel to cut out individual bulbils and lay them into sterilised compost that was a mix of John Innes and multipurpose.

In retrospect it would have been better to use a more well drained compost as I felt it was too wet for polypodiums; a more free-draining mix of John Innes seed, perlite and multipurpose would have been better.

These were kept at about 20°C and on a 14 hour daylight level. These have now been hardened off ready to be transplanted; it will be interesting to see if they return to the parental type or are a vegetative sport.

We will just have to wait.

That was the state of play when this article was written but since then they have developed more. Look at Fig. 5 to see how they have come on.

The form I grew these from is far more developed than they had in the past and I am sure if Charles Druery was using the same material he would have done even better.

*as per article in the *Pteridologist* 2011

Fig. 8. *Polypodium vulgare* 'Cornubiense Grandiceps'

My Automatic Fernery

James Merryweather

During the fifteen years since moving from York to the far Highlands, just six miles from the Isle of Skye, I've done little to the once conventional garden, other than keep the so-called 'lawns' tidy. To be honest, they consist of little more than an irregular wildflower meadow with more common cats-ear *Hypochaeris radicata* and self-heal *Prunella vulgaris* than is decent, and richly colonised by the (to gardeners, not me) notorious moss *Rhytidiadelphus squarrosus*.

Unexpected splendour has been provided by the sporadic appearance of one or other of two Greater Butterfly Orchids *Platanthera chlorantha*. In autumn, all sorts of woodland mushrooms erupt from mycorrhizal fungi associated with the roots of equally diverse marginal trees: besides delightful troops of 'little brown jobs', there are usually *Suillus* and *Boletus* species, one of the Grisettes *Amanita* sp. and some years the spectacular Fly Agaric *A. muscaria*.

Management-wise, I've grown a few vegetables and strawberries in a small, now all-but exhausted, raised bed while carelessly allowing almost half of my property to run wild. Overall, the garden is the way I like it: more-or-less wild and quite vigorous, inasmuch as reclaimed boggy moorland with an old road beneath can be. Recently, I enlisted energetic assistance to clear the abandoned area, which now consists of a new vegetable patch. I'm hoping freshly exposed soil might give improved growing success. The rest has been grass-seeded while I consider future developments.

Of course, I've planted ferns, most of which managed to thrive. *Dryopteris wallichiana*, small and cheap from a garden centre, now equals me in height – favourite. There's *Dryopteris cycadina* (as usual sold as '*Dryopteris atrata*') and *D. erythrosora* (two similar ferns labelled thus, but they flush at different times and only one has red sori), *Polystichum munitum* (bought tiny and will soon be gigantic), *Blechnum* (as was) *penna-marina* and *Blechnum. chilense* (well, it should be, but ...[1]), *Dryopteris filix-mas* 'Barnesii' and *Athyrium filix-femina* 'Victoriae'[2] (a pair of those garden centre specimens that Jimmy Dyce would have called 'miffy').

I also have a couple of glorious *Dryopteris affinis* Cristata 'The King', another great favourite found among the wilted jumble on a Dobbies out-of-season sale bench and resuscitated to magnificence. Predictably, *Onoclea sensibilis* has done rather too well. I have no *Matteuccia*, a perniciously invasive non-native I can visit nearby if I really must see it, and my few failures include what, when bought, promised to be a robust *Cheilanthes*, which simply fizzled out in the Highland climate. I knew all along it would be unsuitable, but it was being sold off cheap, so I had to give it try.

Fig. 1. Newly cleared area surrounded by self-set ferns: *Athyrium filix-femina, Dryopteris filix-mas, D. affinis, D. borreri, D. cambrensis, D. dilatata, D. carthusiana and Oreoptertis limbosperma.*

Over the years of neglecting the garden, I've become aware that several native ferns have arrived unbidden, but until we got down to clearance, I had no idea how many Lady Ferns, *Athyrium filix-femina,* are in every garden round here; they are considered a weed. They occur in every part of the garden, plentiful and given a few years they become huge; both green and red rachis forms occur.

To my immense satisfaction, I also have four out of our five common Male Ferns (*filix-mas*, *affinis*, *borreri* and *cambrensis*), all without gardener intervention, plus a small *Dryopteris oreades* side crown I introduced. Those five, with *Dryopteris wallichiana* and *D. crassirhizoma* also in the garden, add up to almost a full set of British Male Ferns and their confident or putative ancestors.[3] However, where can I get hold of *Dryopteris caucasica* without visiting Azerbaijan?[4] Not many people covet so apparently undistinguished a fern as I do. The only specimen I've seen anywhere was a singleton in a Glasgow garden, definitely not available for collection, other than by photography. My experience has been that you can't buy or even beg it. However, now I have received an offer of spores when ripe, so I might yet have my own ere long.

One fern I like a lot, perhaps because it is unusual and mysterious, is a Male Fern I chose, pot-bound to the extent that its container was bursting, from the late Jack Bouckley's collection before they were unceremoniously carted off to the public gardens to which he specifically did not want them to go. (Fig. 2 below)

Fig. 2. Jack Bouckley's unnamed male fern

It's a weird thing with distinctly dimorphic fronds: vegetative fronds that resemble *Dryopteris filix-mas* while the fertile are reduced, the lamina pretty well

Fig. 3. Jack Bouckley's male fern: Underside of a fertile pinna showing reduced pinnule laminae.

confined to the distribution of the sori, the indusia of which are thin, some tucked under the sporangia, others 'loose' at the edges. (Fig 3)

It's not a large fern (two feet or so) with crowns numerous and crowded, as in *Dryopteris oreades*. It was possibly given to Jack by Christopher Fraser-Jenkins or Clive Jermy, from whom I understood he received several interesting specimens, but it had no label and, therefore, no name or provenance. I would be grateful if anyone recognises this fern and can help sort out what it is.

The Auchtertyre 'volunteer fernery' consists of a Lady Fern and four Male Ferns, besides which there are numerous huge *Dryopteris dilatata*. Then as ground clearance progressed, a couple of *Dryopteris carthusiana* were revealed. Did the spores arrive from the fine colony in the unusual for here willow fen just a quarter a mile away at Nostie (where *Polypodium interjectum* festoons ancient elder trees) or the ex-McHaffie plant in the border by the house? Lastly, the most recent arrival is a six-inch *Oreopteris limbosperma*. That makes the total eight uninvited fern species. Bracken, though close-by is, I think, unlikely, but now that *Oreopteris* has taken up residence, when is its habitual associate *Struthiopteris* (*Blechnum*) *spicant* going to arrive, or do I have to fetch it?*

There were so many ferns hidden in the scrub where I wanted to recover some land, some had to be sacrificed, but those on the margins will stay, creating something resembling a hedge in places. That's an idea: a fern hedge. The wild ferns retained are plentiful enough to determine the architecture of the new garden as it evolves, and now I'll certainly add lots more. Only one is prohibited: that hideous *Dryopteris filix-mas* 'Linearis', while its wild type, in this garden a minority species, is always welcome.

* It arrived this spring to make a total of nine!

(Endnotes)

1. Martinelli, S. 2003. Those Terrible Twins. *Pteridologist* 4:2 54-57.

2. Dyer, A. 2014. The Buchanan Fern, *Athyrium filix-femina* 'Victoriae'. *Pteridologist* 6:1 64-73.

3. Fraser-Jenkins, C. R. 2007. The species and subspecies of the *Dryopteris affinis* group. *The Fern Gazette* 18:1, 1–26.

Merryweather J.W. 2017. Male Ferns: why do botanists find them difficult? *British Wildlife*. 28:5, 318-322.

4. Wikipedia unhelpfully tells us: *Dryopteris caucasica* är en träjonväxtart som först beskrevs av Addison Brown, och fick sitt nu gällande namn av Fraser-jenkins och Corley. *Dryopteris caucasica* ingår i släktet *Dryopteris* och familjen Dryopteridaceae. Inga underarter finns listade.

A New *Asplenium scolopendrium* Cultivar Called 'Doreen'

Tim Brock

This article is about a new *Asplenium scolopendrium* cultivar that was discovered about fifteen years ago in the fern garden of Doreen Stevens. Doreen's nephew, the late John Finch, divided the plant into two and took a piece for his garden in Kent. He decided to name the scollie 'Doreen' after his aunt.

I have wanted write about 'Doreen' for some years but had to wait until the plant material matured enough to see how it might develop.

I think that 'Doreen' is one of the most exciting and beautiful *Asplenium scolopendrium* finds in recent years and it is quite unique. The fronds have lines of ridges running along the surface in a supralineate manner and this causes the edges of the frond to be frilled, but they can also be regularly split in mature plants, which gives a very attractive appearance.

The plants tend to be fairly dwarf or medium-sized and have had a strange feature on three occasions of having a crispum growing alongside of them as though thrown out by the main plant.

There is a vaguely similar plant described in Lowe's Our Native Ferns with an illustration on page 233 called 'crispum-latum'.

When John took his new division home, he gave me some spores; from these arose a whole range of cultivar types, including some that were heavily muricate, cristate, truncate or cornute, but also some that were similar to the parent plant.

Doreen Stevens said that a hart's tongue cultivar growing near her original plant was *Asplenium scolopendrium* 'Applecourt' and I wondered if this might have been in the parentage.

Fig. 1. Frond of plant raised from John's frond base

Fig. 2. Frond of plant raised from spores of John's plant

The sad part of this story is that I had asked John for a frond base of his plant for some time and he did eventually send me some via Gert-Jan Der Kolk, who had helped him to sort out his garden. Two weeks later I had the message that he had died.

It was even more important now for me to try to grow a plant from these frond bases and thankfully one was successful and is growing well; I can call it 'Doreen' as it is an original clone. One of the plants that I grew from the spores John gave me appears more developed than the parent, though it has the similar feature of the raised ridges of lines on the surface; I would like to name this after him and will distribute it when it is able to produce frond bases as 'John Finch'.

Fig. 3. Frond of plant raised from John's plant

Fig. 4. 'Doreen' plant

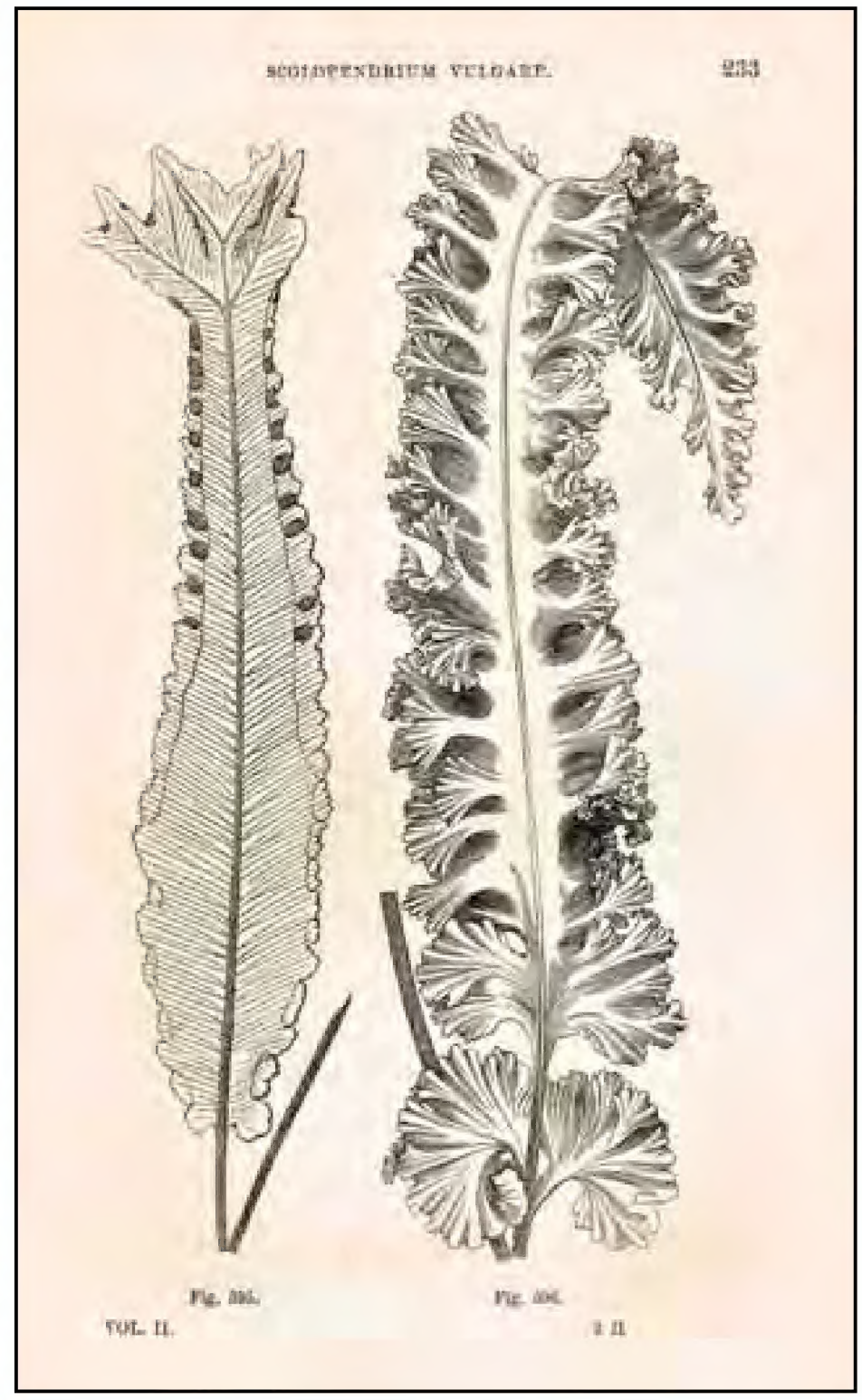

Fig. 7. 'crispum-latum' from Our Native Ferns, Lowe

Fig. 5. 'John Finch' plant

Fig. 6. Frond from 'John Finch' plant

Bigger was Better: *Lepidodendron*, the World's Largest Pteridophyte

Barry A. Thomas

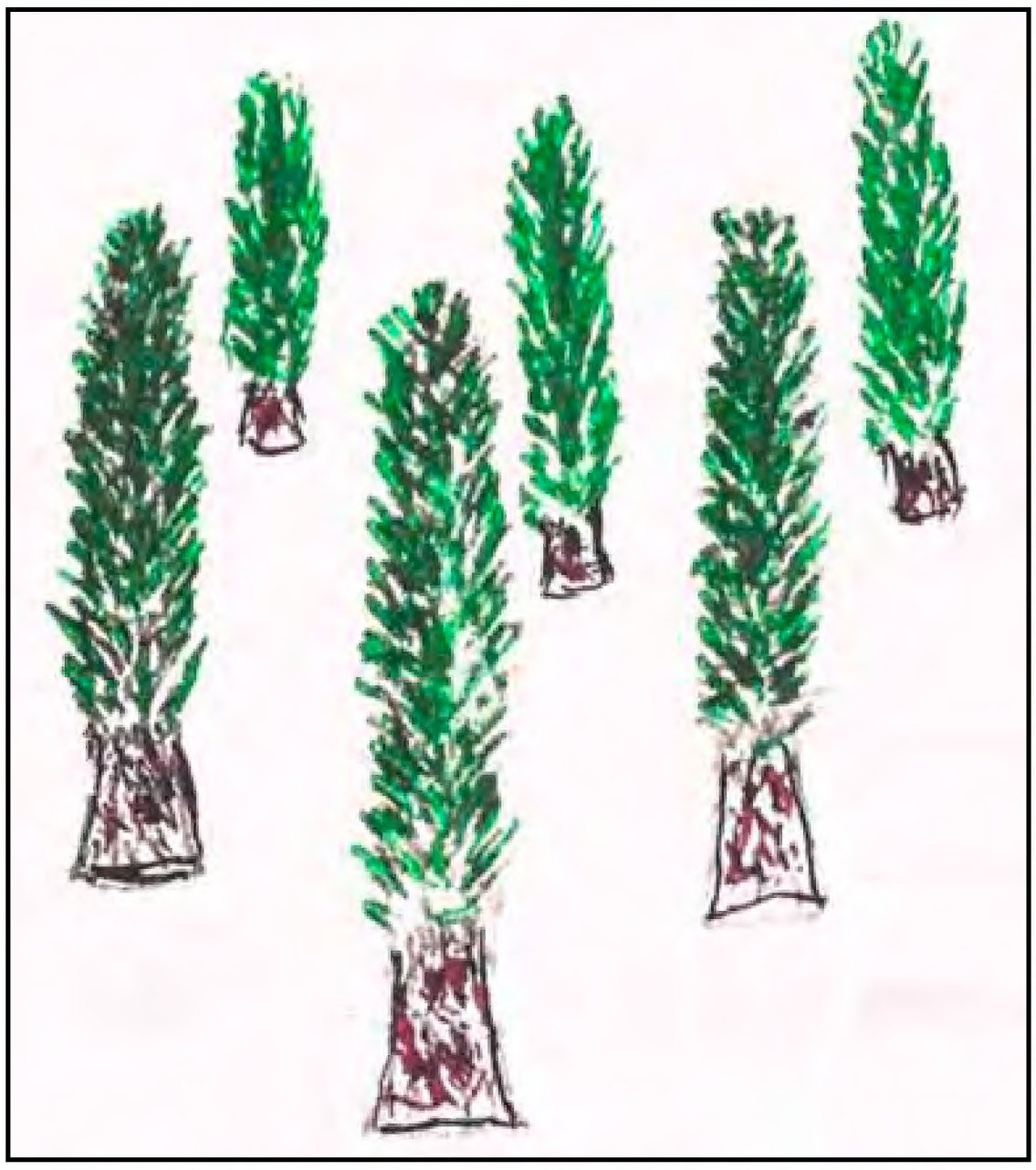

Fig. 1. A stand of young leafy arborescent lycopods (after Thomas & Cleal 2018)

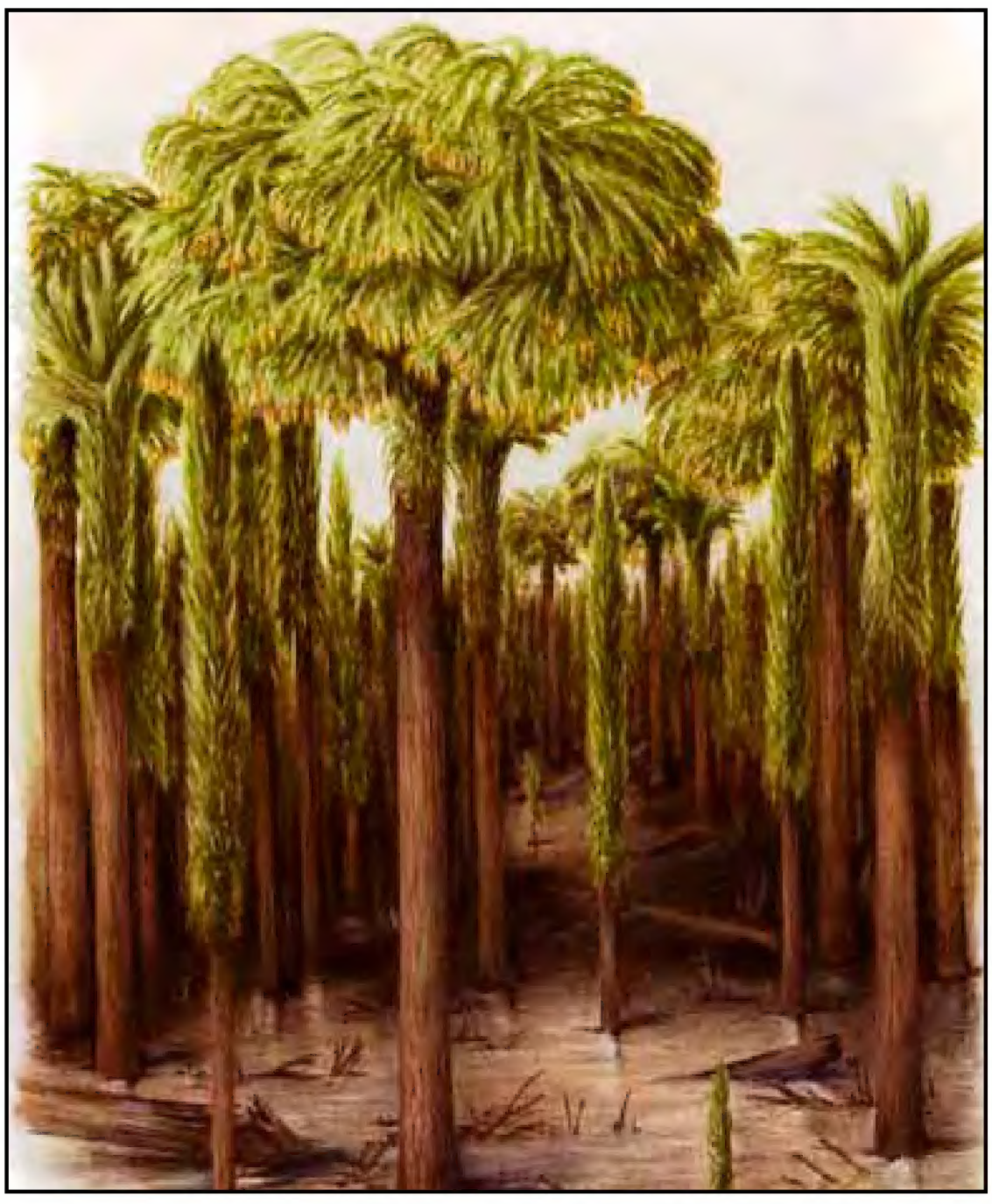

Fig. 2. Reconstructions of *Lepidodendron.* A mature plant with cones is central and a plant showing its initial apical dichotomies is to the right

(Painting by Annette Townsend in Townsend *et al*. 1998).

Lycopods had their beginnings in the Devonian period with relatively small herbaceous plants that were followed by much larger forms that continued into the Lower Carboniferous.

During the Upper Carboniferous extensive areas of coal swamps were formed on the large flat edges of more upland areas that had been exposed by the falling sea levels caused by the growth of the polar Gondwana ice sheet (Waters and Condon 2012). The physical constraints imposed by the mainly waterlogged peat substrates tended to limit the range of plants that could grow there. The result was a unique set of vegetation types that has never subsequently been replicated (DiMichele and Phillips 1994). For most of the Carboniferous the peat substrate vegetation was dominated by arborescent lycophytes. It was at this time that the first of the giant arborescent-like species belonging to the genus *Lepidodendron* appeared in the fossil record. This was a genus that lasted until the end of the Upper Carboniferous, thereby spanning a period of some 60 million years (Cleal & Thomas 2019). *Lepidodendron* flourished in the equatorial coal swamps and at times formed closed communities, which was helped by the fact that there was much lower species diversity at that time compared with modern-day tropical rain forests (DiMichele & Phillips 1885).

In their early stages of development the small leafy stems of *Lepidodendron* (Fig. 1) were growing in full sunlight, enabling them to photosynthesise and grow rapidly (Thomas & Cleal 2018). These plants sprouted upwards to their full height, with *Lepidodendron* reaching about 50 metres tall, eventually resulting in a large plant that looked something like a tree (Fig. 2). Such plants responded to the same environmental pressures as current plants and faced the same problems in having water-transport systems that maximized flow volume but minimized anatomical change. The arborescent lycophytes achieved this by forming a relatively small amount of highly efficient secondary xylem for water conduction (Cichan, 1986), but having a thick, peripheral secondary cortex, or periderm for support.

This growth pattern is quite unlike that of modern conifer and angiosperm trees, where both water conduction and support are provided by large amounts of secondary xylem. When the arborescent lycopods reached full height their apices dichotomised and each subsequent branch dichotomised again until the final branches were only a few millimetres in diameter (Fig. 3). The main stem and branches were covered with long, slender leaves whose bases were expanded and swollen into what we call leaf cushions; rather like those of the living conifer *Cupressus*. The trunks and the larger branches eventually shed their

laminae, although even quite large stems still retained their leaves (Thomas, 1970; Leary & Thomas, 1989). In *Lepidodendr*on the laminae on the older parts of the plant were shed, leaving the leaf cushions, which had diamond-shaped scars from where their laminae had been shed. Within the leaf scars are three prints; the central marking the vascular strand and the two lateral ones, called parichnos, which are part of an internal aerating system (Fig. 4). Cuticle can be prepared from the leaf cushions by oxidization with Schultze's solution - concentrated nitric acid with potassium chlorate - and then dissolving the oxidized material with dilute ammonia solution. This reveals that there were enormous numbers of stomata on the leaf cushions (Fig. 5) with up to 250 per mm^2 in *Lepidodendron aculeatum* Sternberg and 450 per mm^2 in *Lepidodendron dichotomum* Sternberg (Thomas, 1966, 1970). It is practically impossible to be exact in giving the total number of leaf cushion stomata on a mature large lycophyte, but taking into account diameters of stems of known species it is possible to estimate the number of stomata in small sections of stem. For example in a 100 mm length of a 380 mm diameter stem of *Lepidodendron aculeatum* Sternberg using the median value of 225 stomata per mm^2 for only 85% of the cushion area to compensate for the non-photosynthetic leaf scars, parichnos and edges of the cushions, the total number of stomata in this relatively small section of stem is c. 23 million.

This would have made the plants much more photosynthetically active than might be otherwise assumed if only the more ephemeral leaf laminae stomata were taken into account. Because stomata are the main interfaces for gas exchange between the interior of the leaf and the atmosphere, it is generally accepted that any morphological features are adaptations to factors that affect transpiration and photosynthesis. The stomata on most arborescent lycophyte leaf cushions have their guard cells sunken in pits (Thomas, 1974), but this cannot possibly indicate a dry habitat because the plants grew in waterlogged swamps. It is possible that the pits may have facilitated the diffusion of CO_2 to the sites of photosynthesis (Roth-Nebelsick *et al.*, 2009) because the thick leaf cushions of arborescent lycophytes had densely packed mesophyll cells. Because of the number of stomata on the leaf cushions and their sunken nature, it has been estimated that they could reach their fully mature size in as little as 25 years.

The leaf cushions remained photosynthetically active until they were sloughed off from the largest/oldest stems by secondary growth, leaving an exposed surface of periderm. However, it is also important to realize that the leaf cushions could move apart to some

Fig. 3. Terminal leafy shoots of *Lepidodendron ophiurus* (width of stems c. 3mm). From Thomas *et al.*2018. (National Museum of Wales no. 2013 43G 108)

Fig. 4. Leaf cushions showing leaf scars with three prints (each c. 30 mm long. *Lepidodendron yohoense* Jackson (USNM 10968). (From Thomas, Jud & Seyfullah 2019)

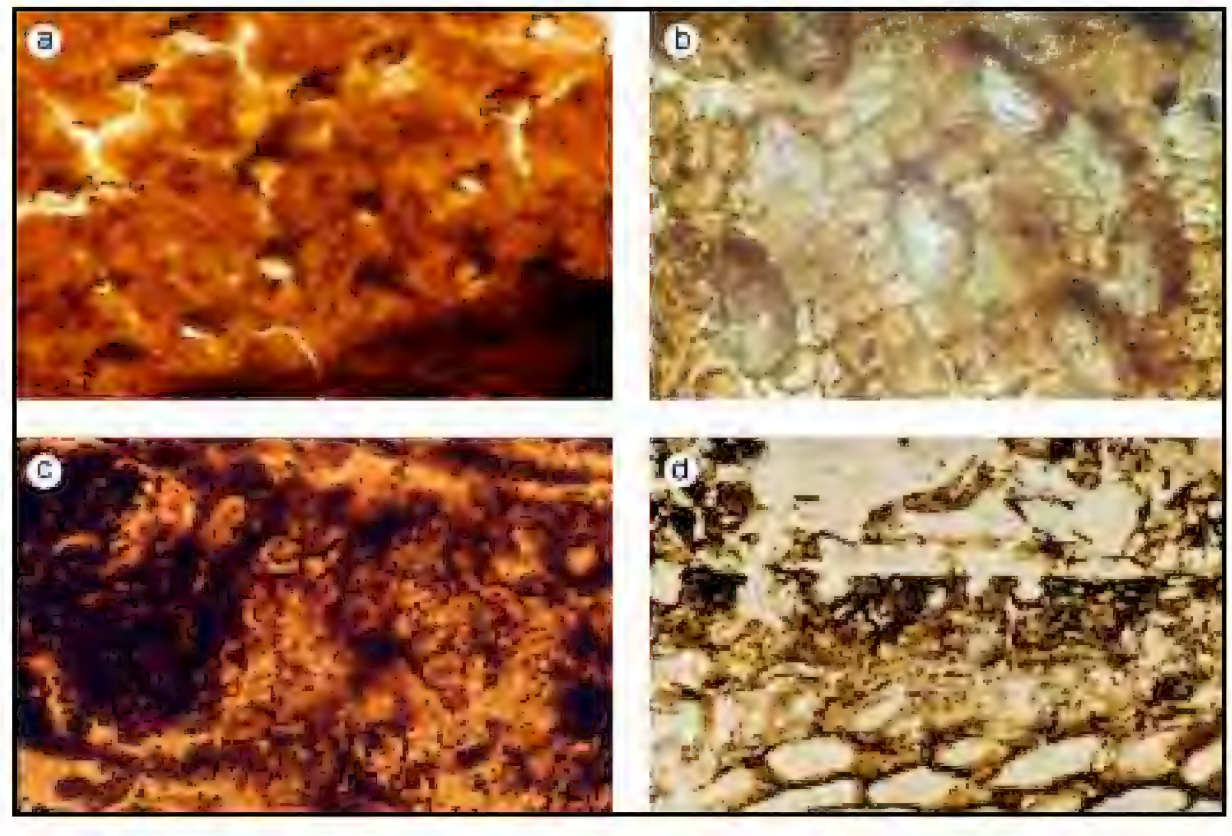

Fig. 5. a-c. Lycophyte leaf cushion cuticles showing the periclinal walls of the epidermal cells and the thickened walls of the pits within which are the sunken guard cells (c. 40 x 18 µm). d. Vertical section through three-dimensionally preserved cushion tissues showing the guard cells sunken in pits (12-15 µm deep). (From Thomas & Cleal 2018)

extent by the expansion of the inter-cushion epidermis during the early stages of secondary growth (Thomas, 1966, 1970), allowing the outer photosynthetic surface to remain attached to the stem even after a significant increase in its girth.

The growth and reproduction of the arborescent lycopods was also different from what would be expected with woody trees. Conifers and angiosperms trees will typically grow to a fully mature size and meanwhile produce seeds over many decades, if not centuries. In contrast, a detailed study of the anatomy of the lycopsid stems has shown that the amount of secondary thickening in the branches grew smaller at every dichotomy. Diameter of the branches is therefore no indication of age; this method of development is known as determinate growth (Thomas 1978). Reproduction was initiated through the development of cones on the ends of the terminal branches. These bisporangiate cones, producing both megaspores and microspores, are called *Fleminigites* (Brack-Hanes and Thomas 1983) (Fig. 6) and had spirals of sporophylls, each having a single sporangium on its upper surface. The basal parts of the cones produced megaspores and the apical part microspores. The spores' outer surfaces are made of sporopollenin and they can be prepared from the cones using the same method as used for preparing cuticles. When shed, the spores developed endosporic prothalli and fertilising followed the same pattern shown by living Selaginella; a genus that had its origins in the late Carboniferous.

While the stem was growing its 'rooting' system, called *Stigmaria*, it was also dichotomising and enlarging in diameter (Thomas & Seyfullah 2015) (Figs 7, 8). *Stigmaria* is better thought of as a rhizophore because it was an organ that produced large numbers of true roots departing at right angles to its axes. (Fig. 9).

The giant lycopods lived and died in water-logged conditions (Fig. 10) and their remains accumulated into thick layer of peat. Every now and again the forests were destroyed through enormous amounts of sediments coming in from the rivers than ran through the swamps. It is highly likely that such destructive events were brought about through tropical storms or cyclones that destroyed the vegetation and breached the river levees (Thomas & Cleal 2015). Once conditions stabilise the area would have soon been recolonised by the lycopods. Meanwhile, the entombed peat deposits underwent compression by the overlying sediments and turned into coal.

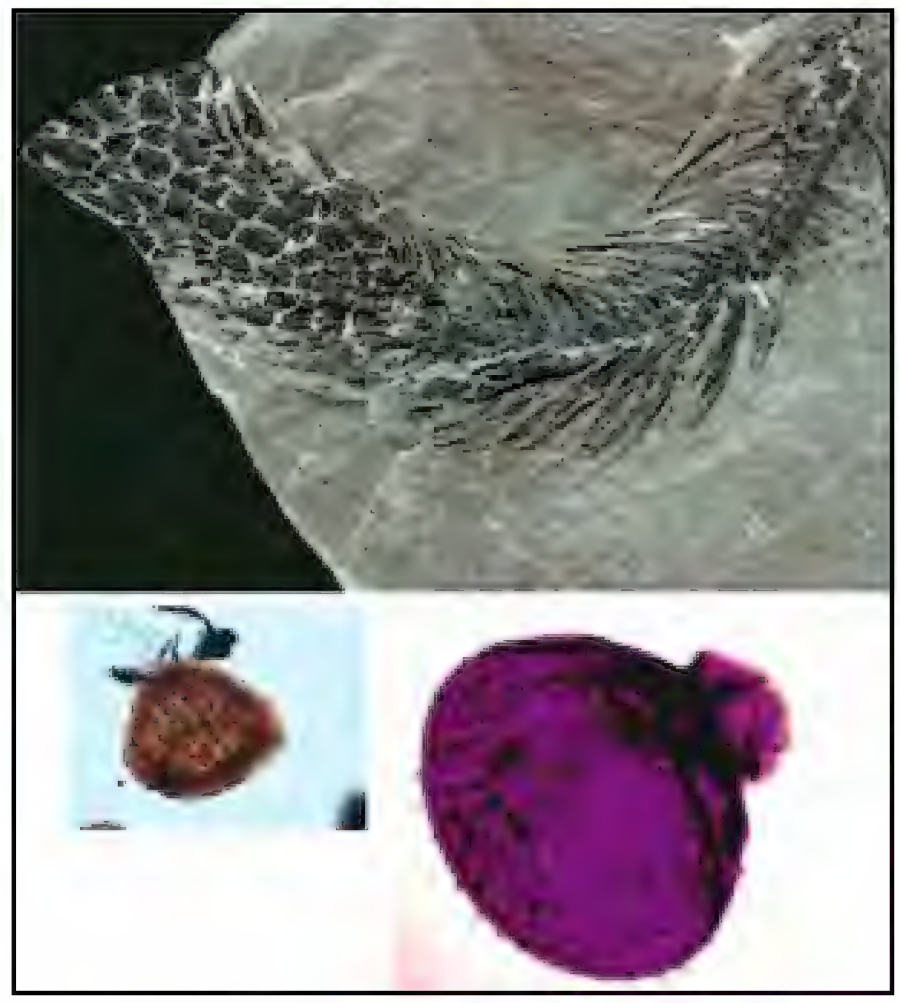

Fig. 6. *Flemingites* cone attached to terminal shoot of *Lepidodendron ophiurs* (National Museum of Wales no. 2013. 43G 40). Lower left: a microspore (*Lycospora*) c. 25 µm in diameter. Lower right: Spiny megaspores (*Lagenicula*) in lateral view showing the three contact faces and projecting aperture c. 1mm in diameter.

Fig. 7. *Stigmaria*: A. The basal portion of the stem, being excavated at Brymbo, Wrexham, North Wales. B. Within the specially constructed building in Victoria Park, Glasgow. C. The reconstructed Brymbo specimen in a temporary exhibition at Wrexham Museum. (A, B from Thomas & Seyfullah 2015)

Fig. 8. The author having a rest on a large *Stigmaria* reconstructed in Lister Park, Bradford

Fig. 9. Model of the terminal part of a *Stigmaria* rooting structure showing the helically arranged true roots arising at right angles to the main axis (Model by Annette Townsend in Townsend *et al.* 1998)

Towards the end of the Upper Carboniferous, large areas of the coal swamps were destroyed by changing palaeoecological conditions that were caused by tectonic activity (Cleal and Thomas 2005; Cleal *et al.* 2010, 2011) with the only geographically extensive swamps surviving in the USA at the far west of the so called Euramerican landmass (e.g. McComas 1988; DiMichele *et al.* 1996a). Most of the aborescent lycopods, therefore, died out at this time, probably in response to a drying-out of the swamps. Only a few genera of smaller stature survived into the following Permian period. It is generally accepted that later lycopods represented some kind of series of size reduction that culminated in extant *Isoetes* that made its first appearance in the late Cretaceous (Cleal & Thomas 2019).

Fig. 10. Aerial view of a *Lepidodendron* dominated swamp (from Thomas & Cleal 1993)

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Tectaria devexa in Australia

Pat Acock

I met my friend Emma Rayner and asked where she had been for her holiday, knowing that she usually travelled somewhere exotic after going to remote places on school trips. She said she had been to Australia with her parents for 5 weeks. We had been standing chatting for a while when she said suddenly, 'I have something for you' and started searching her mobile phone picture collection. She said that after a long drive she decided to visit some limestone caves in Central Queensland known as Capricorn Caves. She was told by the guide she was in a unique conservation area; she was also told the fern she was looking at was one of the rarest in Australia. She showed me the picture, which I somehow guessed was a *Tectaria* (Fig. 1), and told me she had written down the name which she gave me as "Genus? *devexa*" I told her that I did not recognise the genus.

At home I turned to the fern volume of the Flora of Australia vol 48 (CSIRO) and could not find the genus she had been given, but, scanning the index, saw immediately *Tectaria devexa*. Peter Bostock's notes in the Flora of Australia made clear that the fern Emma had been taken to see was this fern. It mentioned that the cave, 24km north of Rockhampton, was the only site in Australia for the fern. Subsequent to the Flora of Australia publication, a very small population was reported from a few kilometres north of the Capricorn Caves location, on the edge of the Mount Etna complex, but it is not known if it still occurs there.

Fig. 1. Emma Rayner's picture of the *Tectaria devexa* she was shown on holiday near Rockhampton that started the article. August 2018

Photo: Emma Raynor

Peter's notes mentioned using an unfinished piece by Professor Holttum so I e-mailed Peter to see if he could send a copy of the notes relating to this fern. Next day, working at the Natural History Museum in London, I went through all the Tectaria sheets to see more of the fern and to establish any variation over its range from Sri Lanka eastwards to New Guinea. Unfortunately, although we had a fine collection over the range, we did not have one from Australia. They were all of course determined by Professor Holttum (Fig. 2).

Fig. 2. *Tectaria devexa* from Taiwan on herbarium sheet in Natural History Museum

I told Peter how, when databasing all Clive Jermy's correspondence to and from the Museum from 1970 to his last visits, I had come across one of the Professor's last letters where poignantly he wrote that he had just finished the Tectaria Paper and sent it to the Flora Malesiana editors; he said that he did not feel he could start another genus.

Next day Peter wrote back to me to tell me that the ferns were being looked after by the owner of Capricorn Caves and that Peter had been monitoring the plants from 'the mid to late 2000s'. Some of the walls during this period were virtually devoid of *Tectaria devexa* – see picture of 2008 (Fig. 3). Scattered about were roughly 2 dozen moderate to large plants with an unknown number of sporelings. Most of the plants were in areas where a single shaft of sunlight fell once a day or were in deep cuttings on the edge of the cave entrances.

Peter in the late 2000s worked with others, including Greening Australia, Heatons Wholesale Fern Nursery and the Kershaw Gardens, Rockhampton, in attempting to increase

Fig. 3. Peter Bostock's picture of cave wall in April 2008

Photo: Peter Bostock

Fig. 4. George Cornwell's picture of same part of wall in January 2016

Photo: George Cornwell

the small population in Capricorn Caves. Some seven hundred plants in 4 inch pots were produced but they discovered it was not easy to introduce grown plants to the cave. Soil is almost non-existent apart from on the floors of the caves and niches in the walls that were already occupied by the ferns, or when introduced to more accessible places they were rapidly cropped by rock wallabies. The ferns did not naturally grow on the floor except in some well-lit places closely associated with limestone rocks. They came to the conclusion that any additional ferns would at least add to the available spore bank since they were all fertile when placed in the caves.

Another factor in their seeming demise in the middle to late 2000s could be the drought during that period with less rain percolating down. The photo taken in January 2016 by George Cornwell (Fig. 4) after the Queensland deluges of early 2011 shows the same patch of wall as in Peter's earlier photograph. It would appear that *Tectaria devexa* is well adapted to the conditions and in the long term survives through drought when its rivals cannot. More recent information from the Caves indicates that the plants are now drying out again.

The idea for writing about this disjunct *Tectaria* came when I read about it in the Flora of Australia and remembered the *Tectaria heracleifolia* I had written about in an earlier *Pteridologist* (2009). It was also a disjunct species from Mesoamerica slipping into S. Florida and Texas in the USA. Both *Tectaria. devexa* and *Tectaria. heracleifolia* occupy similar low light habitats in limestone caves and deep gorges. These habitats are quite interesting and often have rising warmth from below the ground, difficult habitats to colonise probably making the chance spore arriving from distant places successful. They also survive irregular water availability and probably require recolonization from their own spore banks from time to time.

I would like to thank Emma Rayner for initiating the article and for permission to use her picture as well as George Cornwell's permission to use his picture. Thanks go to Peter Bostock (a Research Associate at the Queensland Herbarium) especially for all his help in providing a large quantity of the information, pictures used in this article and also help in writing and checking the article. Thanks to Zoe Knapp of the Australian Biological Resources Study Department, and to the staff at the Natural History Museum (BM) in London for use of their Archives and Fern Herbarium.

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In Search of *Asplenium hybridum*

Andrew Leonard

It must have been some time in 2014 that Tim Pyner asked me if I would like to accompany him to Croatia to look for *Asplenium hybridum*. I had never heard of this fern and was not sure if it was actually a species or some kind of hybrid. I did not know at that time that Tim had had a special interest in this fern. I think he proposed going for a long weekend but that seemed too much like hard work. I did some research and found that there were other places of interest to go to in Croatia and proposed we spend a week. Tim agreed, I think happily.

By a strange coincidence a member from the now defunct GEP sent me a Christmas email from the Losinj Islands of Croatia showing pictures of *Asplenium hybridum* that he had found there (Fig. 1). I forwarded this email to Tim but he preferred going to Rab Island, as he had some information for that island and it seemed easier to get to.

Fig. 1. The Christmas email from Jean Charles Bertier showing pictures of *Asplenium hybridum*

LITERATURE

However, even Tim admitted our information was far from perfect. What he had found was a paper called "Speleobotanical research into three caves on the Island of Rab (Croatia)" by Buzjak & Vrbek. This stated that *Asplenium hybridum* could be found in a cave called "Spilja na rtu Frkanj" and was "quite well distributed in Rab, especially on the old ramparts of Rab town". There was a diagram of where the cave was (Fig. 2) and where the plant was, in and around the mouth of the cave.

We also found a paper "Speciazione E Distribuzione Geografica Nelle Pteridophyta" by Pichi Sermolli. This showed the total world population contained in the Islands of Losinj, Rab, Sveti Grgur, Goli and Dolin. It showed 15 locations (dots) for *Phyllitopsis hybrida* (as it was then called).

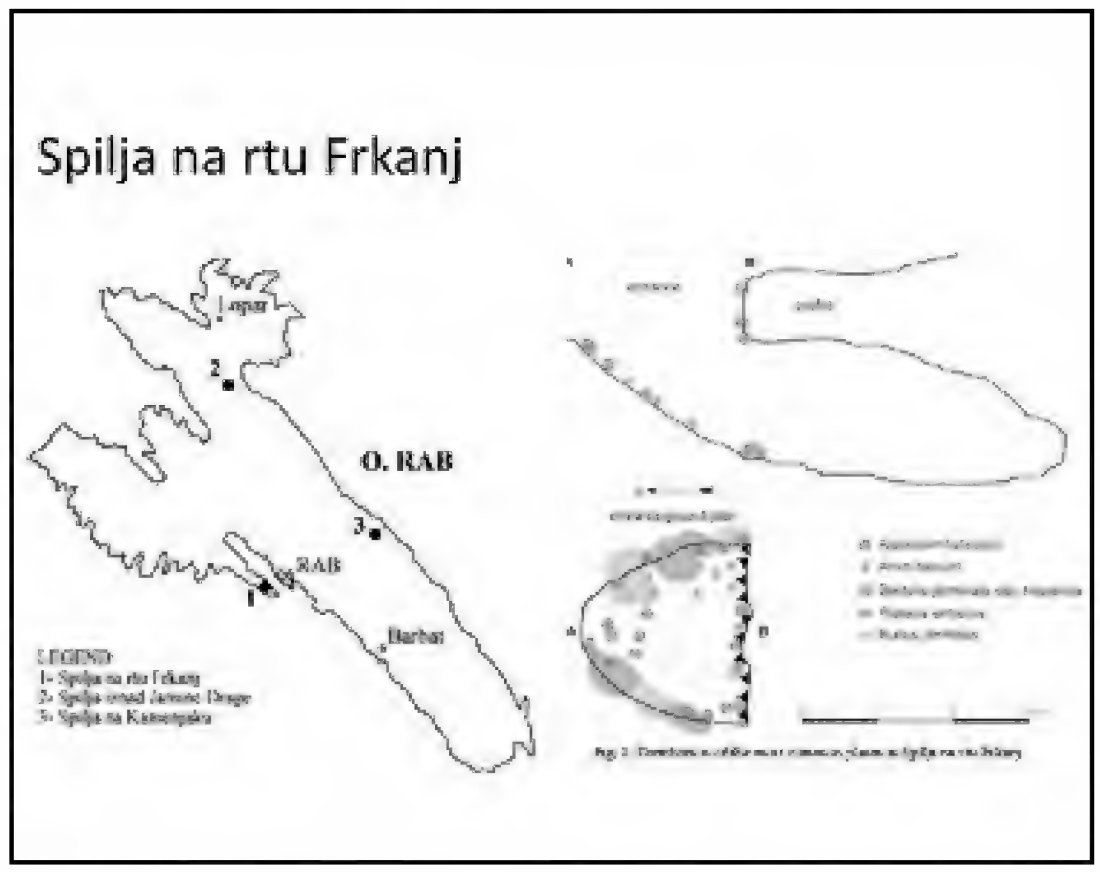

Fig. 2. The diagram showing the cave called Spilja na rtu Frkanj where *Asplenium hybridium* grows

THE EXPEDITION

So we set off for Croatia in April 2015. We spent some days around Zagreb and then drove south to get the car ferry from Stinica to Rab Island. That night we settled into our delightful B&B and in the morning we went off to find the cave.

The island of Rab has typical Mediterranean habitats, with tall scrub and pine forest at lower elevations and bare, sun-scorched rock at higher levels (Fig. 3). Despite the unlikely looking terrain, ferns were surprisingly frequent, although restricted to a small range of species, mainly Spleenworts, including *Asplenium ceterach*, *A. onopteris*, *A. ruta-muraria* and *A. trichomanes* and also Bracken, *Pteridium aquilinum.*

Rab Island Habitat
• Habitats are typical Mediterranean
• Ranging from tall scrub and pine forest at lower elevation
• To bare sun scorched rock an higher levels

Fig. 3. Showing the typical Mediterranean habitat ranging from sun scorched rock to tall scrub and pine forests at a lower level

FINDING THE CAVE

After some searching, we did manage to find the cave as described in the article (Fig. 4). The cave was a lot

Searching for the cave
• We had a fairly good idea where the cave was located
• We set out along a trail along a promontory
• After much searching we found the cave entrance located a few metres from the sea
• Not quite what we were expecting!

Fig. 4. When we found the cave it was a lot smaller than we anticipated

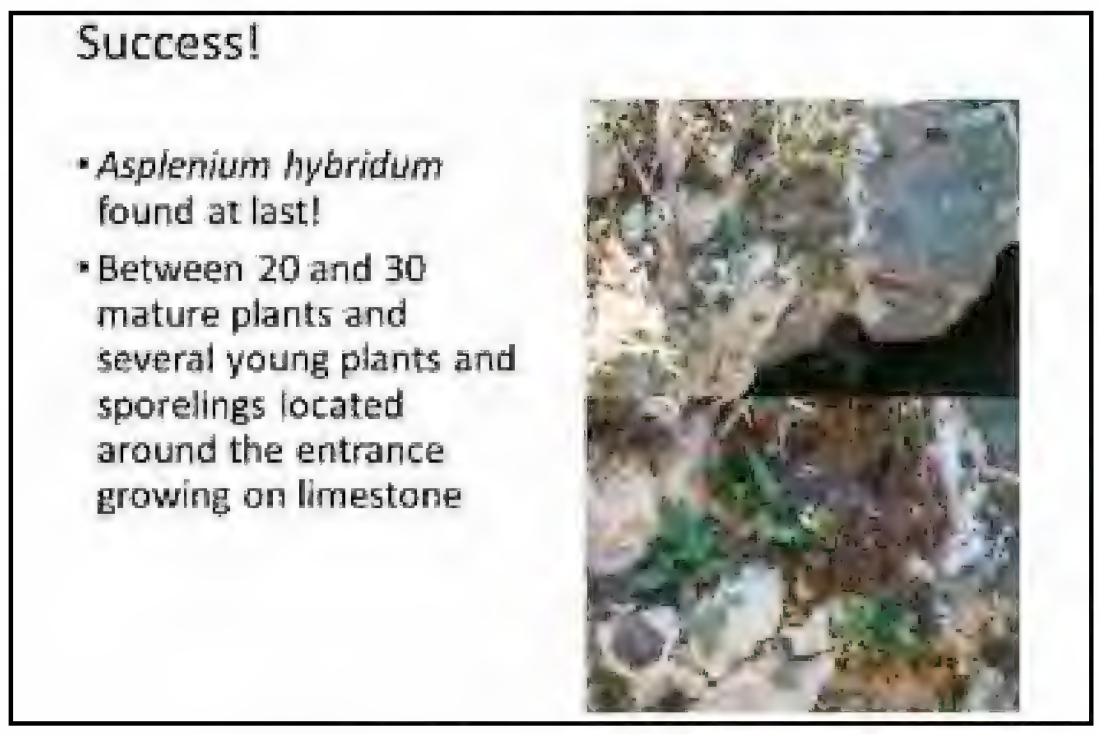
Success!
• *Asplenium hybridum* found at last!
• Between 20 and 30 mature plants and several young plants and sporelings located around the entrance growing on limestone

Fig. 5. *Asplenium hybridium* growing outside the cave

Fig. 6. The variation of the fronds

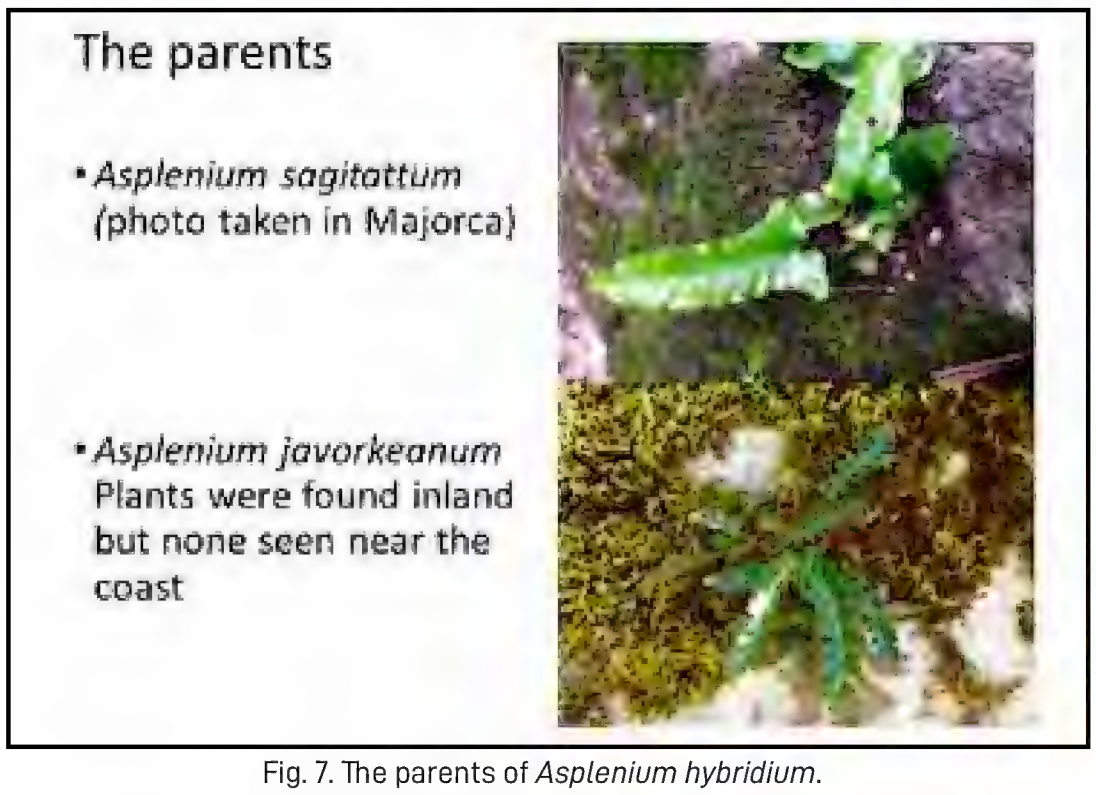
The parents
• *Asplenium sagitattum* (photo taken in Majorca)
• *Asplenium javorkeanum* Plants were found inland but none seen near the coast

Fig. 7. The parents of *Asplenium hybridium*.
Asplenium sagitattum (top) and *Asplenium javorkeanum* (below)

smaller and more insignificant than we had imagined but we did find some plants of *Asplenium hybridum* around the entrance to it. There were between 20 and 30 mature plants and several young plants and sporelings located around the cave entrance, growing on limestone (Fig. 5).

The cave was near the shoreline and we looked across a narrow inlet to see the outline of what looked like "old ramparts of Rab Town".

Buoyed up by our success, we determined to go to look at the old town of Rab. As luck would have it we started at the wrong point and walked for some time all around the old town until we eventually found some large colonies on the eastern walls that were north facing.

The fronds appeared to be quite variable, ranging from sagittate and unlobed to prominently lobed along the basal half (Fig. 6). Most references describe uneven lobing and do not mention unlobed forms. The key diagnostic character was that the abaxial side of fronds was sparsely covered in scales, showing intermediacy between the two parents. Several sporelings and young plants were seen at this site, but there was no evidence of the parental taxa, *Asplenium javorkeanum* or *Asplenium sagittatum*, anywhere on Rab.

Although we stayed for a few days on Rab, we did not find any more plants of *Asplenium hybridum*.

SCIENCE

Asplenium hybridum is a rare fern, endemic to the Kvarner Islands, off the coast of Croatia.

It is a fertile allopolyploid derived from the hybridization of two dissimilar species of aspleniums that have in past been considered to belong to the different genera *Phyllitis* and *Ceterach.*

One parent is the diploid form of Rustyback, *Asplenium ceterach* subspecies *bivalens* or *Asplenium javorkeanum* if considered a separate species.

The other parent is *Asplenium sagitattum* a rare Mediterranean fern related to Harts-tongue (*Asplenium scolopendrium*) (Fig. 7).

Acknowledgements :

I wish to express thanks to Dr. Mary Gibby for her help in converting the PowerPoint presentation into coherent text

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The Discovery of Apospory

Ian Unsworth

We are all familiar with germinating spore to acquire the new ferns we need but imagine the excitement in the 1880s when a new method of propagation, never before seen, was discovered. Apospory is the formation of prothalli directly from the frond, without the need for spore, and for young ferns to then grow from these prothalli.

The glory for the discovery of this eccentric method of propagation belongs to Charles T. Druery (Fig. 1) who made the break-through in 1884 with what we now call *Athyrium filix-femina* 'Clarissima Jones'. This fern was originally known only as 'Clarissima', the 'Jones' epithet was only added to distinguish it from another 'Clarissima' discovered in Lancashire.

Clarissima had been found 16 years earlier, in 1868, by R. Moule, who was a nurseryman in Ilfracombe (Fig. 2). Mr. Moule appears not to have been very impressed by his find as he left it to wilt on a bench in the sun. The plant was rescued and revived by Colonel A. M. Jones, who named it after his wife Clara Belinda. Clara was to sadly die aged 29 of a throat tumour after 12 years of marriage and just 8 years after the cultivar had been discovered.

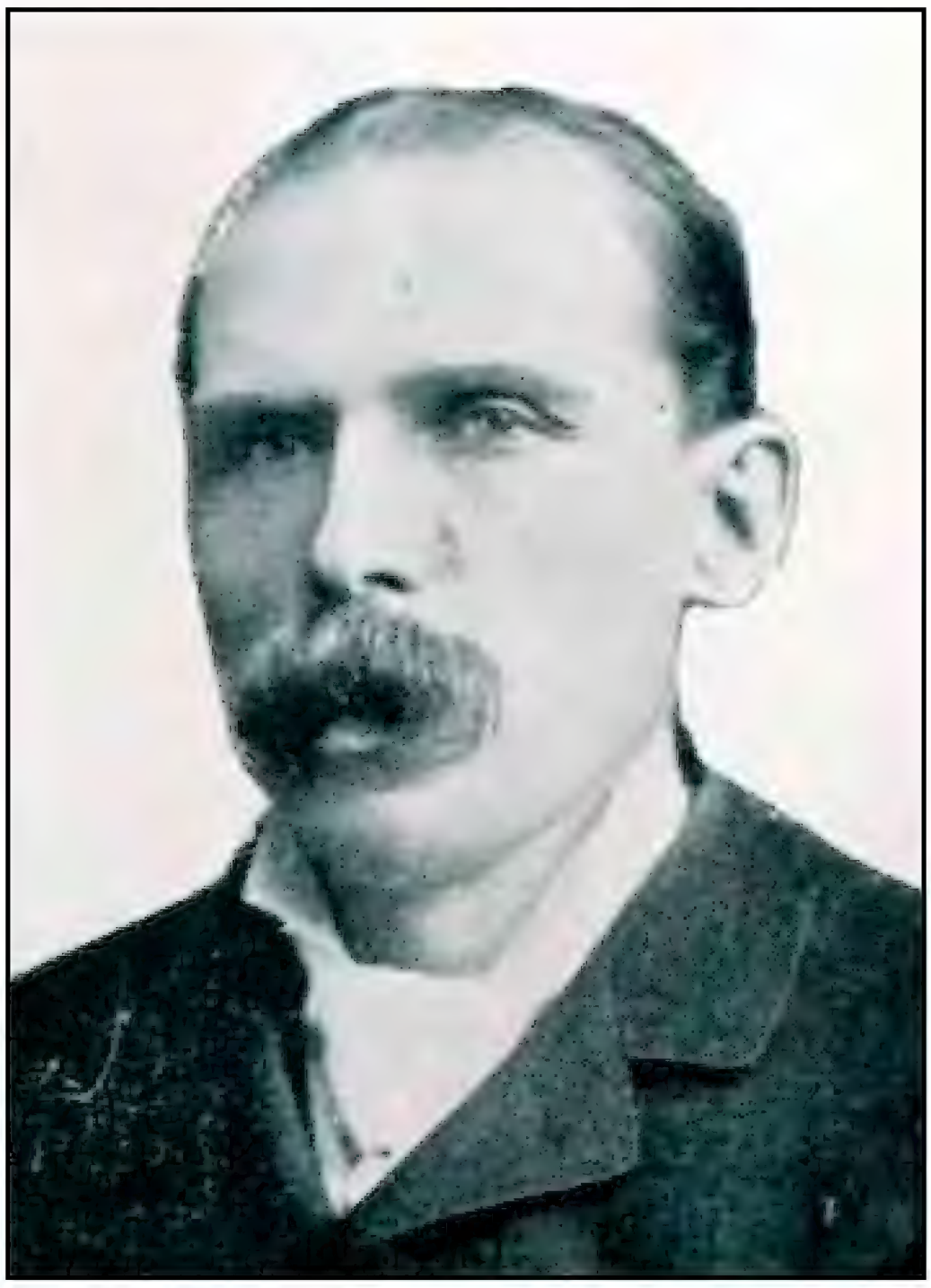


Fig. 1. Charles T. Druery taken from The Gardeners Magazine 1897
Courtesy of the BPS Archives

Druery had been propagating with bulbil-bearing ferns for some time and had gained a reputation for this work. Mr. G.B. Wollaston had been trying to find some way of propagating *Athyrium filix-femina* 'Clarissima', as the cultivar was not only sterile but it was particularly shy at producing crowns.

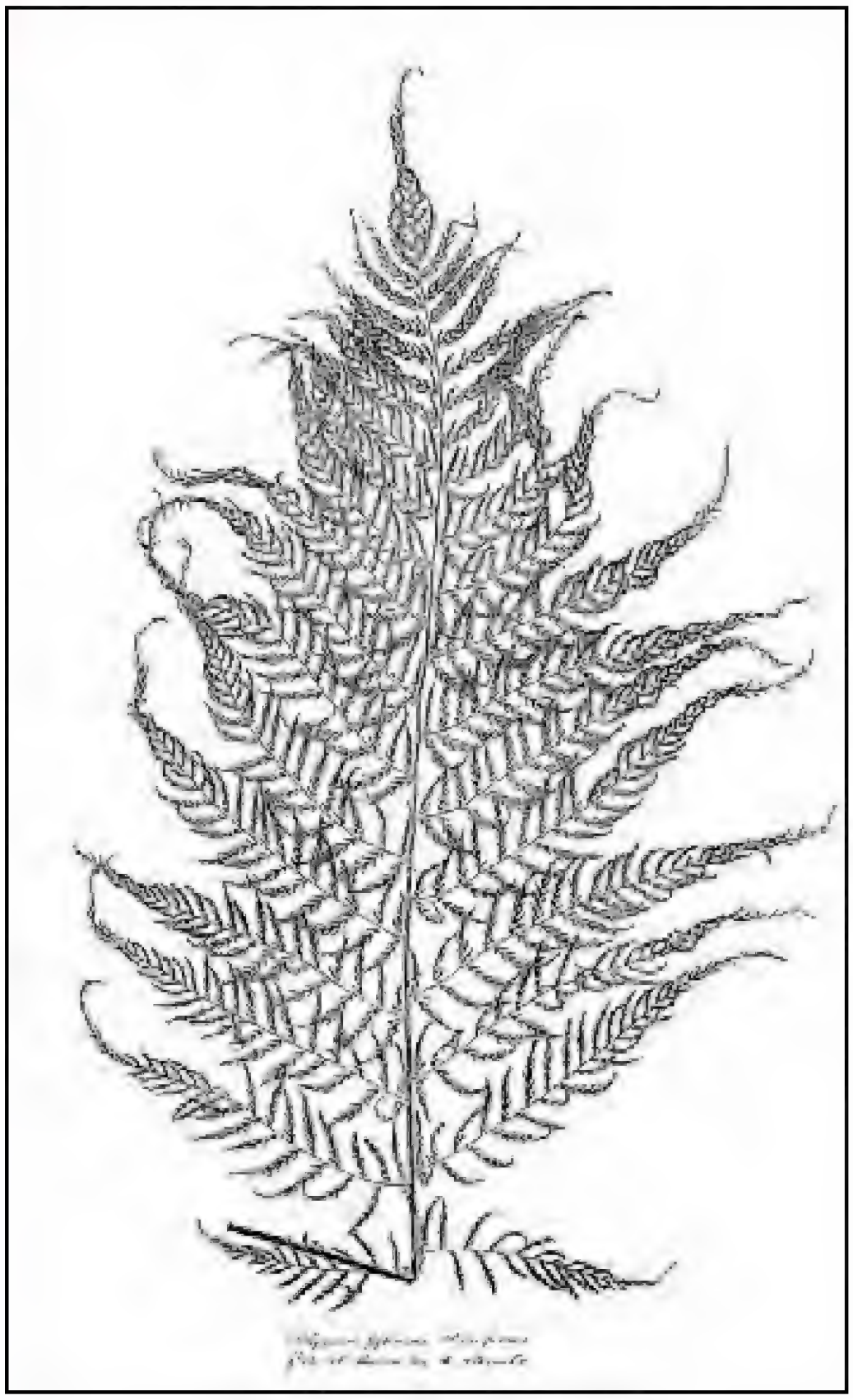


Fig. 2. *Athyrium filix-femina* 'Clarissima'
(Jones Nature Print)

Druery writes,

"In the Autumn of 1883 I discovered upon another Athyrium (A.f.f., var. plumosum divaricatum) numerous proliferous bulbils occupying the place of sori on the back of the fronds; and, reporting this to Mr.G. B. Wollaston, he was led to re-examine A.f.f. clarissima, as the fern in question had been named by Col. Jones, and came to the conclusion that these so far barren excrescences might be viviparous growths of a kindred nature, and capable of reproducing the parent form by direct bud-development."

Mr. G. B. Wollaston sent Druery *"a portion of a frond"*, from his *Athyrium filix-femina* 'Clarissima' so he could examine it under a microscope. Druery writes:

"I found that there were very material structural differences between the unmistakable bulbils of A.f.f. diviaricatum and the singular growths upon A.f.f. clarissima, the former being solitary bud-like growths seated in the centre of a number of brown lanceolate scales and without a trace of indusium; while the latter were composed of 5 or 6 or more flask-shaped bodies each one larger than the bulbils aforesaid, and seated within an undoubted indusium".

Druery continues, *"To test their capabilities I laid down on Nov. 27, in a duly prepared seed-pan numerous pinnae, which I embedded edgewise halfway in the soil, the growths being thus brought into immediate contact with it, laying as they did along the rhachis of the pinnae. I then placed the pan in slight heat, with the result that the pseudobulbils immediately began to increase in size and to develop in such a fashion, that on Dec. 24 I was able to record an evident foliaceous extension and division of the tips of the pseudobulbils, and the appearance of numerous long rigid glassy-looking rods or hairs which sprang from their bases".*

"Eventually all the tips of the flask-shaped bulbils assumed the form of perfect prothalli of the usual size and shape, the pseudobulbils themselves being absorbed and disappearing, and the usual root-hairs developing under the prothalli. On March 17 several of these prothalli were examined microscopically, both by myself and by the Rev. Mr. Aubrey, of Salisbury (to whom I am indebted for aid in observing the final stages of growth), and well-developed archegonia were found in the usual place and number, but so far neither of us was able to detect antheridia. In early May, however, I succeeded in finding a single antheridium; and it is manifest that many others must have been present on the prothalli not examined, as on May 21 the final stage was reached. Small fronds being visible in several cases, projecting from the bifurcation of the prothallus, and evidently therefore produced from the archegonia by ordinary sexual mode of reproduction: through the prothalli, as has been shown, had developed from growths that differed widely from spores in their form, their size, persistent adherence to the pinnae, their production of root hairs from the surface, and finally, the development of the prothallus from their apices by simple extension of growth".

That May, a crop of around 300 Clarissimas grew from these prothalli, although Druery was keen to point out that they could not have developed from spore as no spore or spore cases could be seen when the pinnae were placed in the pan. Also all attempts to produce this cultivar from spore had failed and he had observed the development of prothalli from the pointed tips of the pear-shaped pseudobulbs (Fig. 3) and subsequent development of the prothalli.

Fig. 3.

Charles T. Druery was a fellow of the Linnean Society and presented a paper outlining his observations at the meeting on 19th June 1884:

"I gave an account of this to the Linnean Society, but as I could only shew results and not the stages which led up to them, and as the phenomenon was entirely new and unrecorded in any previous connection, it was suggested that I should make a fresh experiment and report again. I did so after obtaining same results, and on the strength of this Professor F. O. Bower took up the matter for deeper investigation, and eventually confirmed the discovery entirely".

This second presentation was given to the Linnean Society at their meeting on the 20th November 1884, and not surprisingly, Druery discusses much of what he had presented in June but concludes with:

"My present object being to confirm as far as possible the data I gave in June, I would call your attention, first, to the existence of young plants upon the table, raised as described; and secondly, to the manifestly non-soriferous form of fructification borne by the parent plant, an examination of which will, I think, go far to convince you that its offspring are engendered neither through spores nor by bulbils, but by some other mode of reproduction – a mode which, from constant and careful watching through all its stages, I believe to be one so far unrecorded in connection with any other Fern, viz., through prothalli produced not from spore, but by direct bud-growth from the parent frond".

Professor Frederick Orpen Bower M.A. F.R.S. was an English botanist and a fellow member of the Linnean Society. By 1880 Professor Bower was assistant lecturer in Botany at University College, London. He moved in 1882 to South Kensington, where he was a full lecturer in Botany and he continued with his studies at Kew gardens. By 1885 he was given the Chair of Botany at Glasgow University, where he remained as a professor until 1925.

It was decided that this new form of propagation should be investigated thoroughly by Professor Bower and that he should report back his findings. His exhaustive report was read to the Linnean Society on the 18th December 1884.

"Mr C.T. Druery has already drawn the attention of the Society in two successive papers to Athyrium filix-fœmina, var.clarissima, ascribing to that plant a mode of transition from the sporophore generation (or Fern-plant), to the oophor[1] (or prothallus), without the intervention of spores."

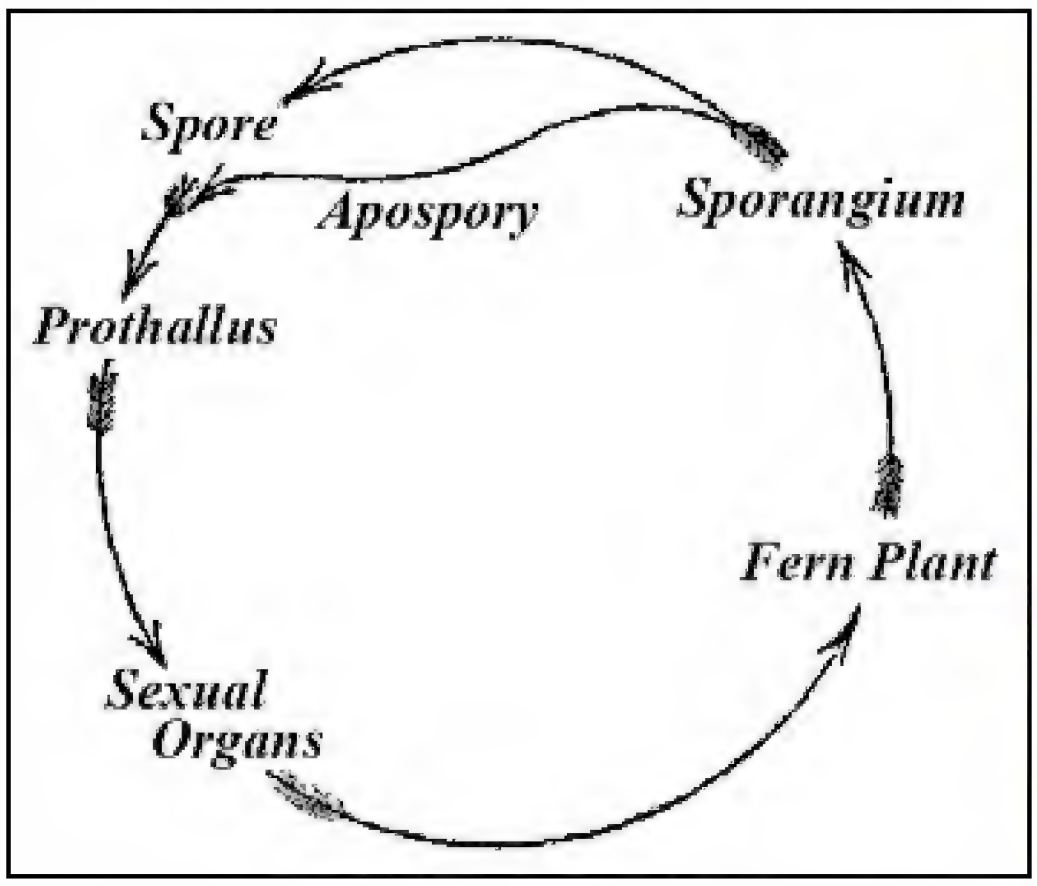
"We are indebted to this observer not only for the communications already received from him, but also for his generosity in supplying to the Royal Gardens at Kew material fitted for the more detailed microscopical analysis of the process".

This Clarissima "material" had been requested by Dr. Murie, Professor Thiselton Dyer and some other unnamed person but it was Professor Dyer who passed it onto Professor Bower at his laboratory at "Jodderell".

Professor Bower goes on to write: *"The sori in Athyrium filix-femina, var, clarissima, appear in the normal position with a normal indusium. In the condition in which the specimens were when first I received them (Nov. 29), the large majority of the sporangia presented an abnormal appearance. Some few appeared of nearly*

normal structure with an annulus, but were arrested at a point of development before the formation of the spore; others, and indeed the majority of them, showed more or less distinctly the central archespore, together with the cells which could normally form the wall of the sporangium; but there the normal development seemed to have been suddenly arrested – the archespore had not in these cases divided further to form either the tapetum or the mother-cells of the spore".* (*This sounds rather technical but 'archespore' is spore producing tissue).

"we now see in the case of Athyrium filix-femina, var. Clarissima, that the spores are not developed, but that there is a direct passage by purely vegetative growth from the sporophore generation to the oophor; and that in this plant the prothallus originates, as a rule, from the arrested sporangium. This may be illustrated thus:-



It is Professor Bower who named this form of propagation 'Apospory' in this 1884 report.

Around this time Mr. G. B. Wollaston discovered a soft shield fern *Polystichum setiferum* 'Pulcherrimum Padley' that was producing prothalli from the extreme tips of the frond divisions. Sometime later Druery discovered a fern in his collection - *Polystichum setiferum* 'Pulcherrimum Wills' was doing the same thing. Druery also came across a *Dryopteris affinis* 'Cristata' which had been growing in a Wardian case and was producing prothalli at the tip of every frond *"and eventually broke out into a rash of them all over the surface, an affection, however, which it threw off entirely as it grew up".*

Dr. F. W. Stansfield also discovered apospory in *Dryopteris affinis* 'Apospora', which Druery suggested was a *"spore sport"* of *Dryopteris affinis* 'Cristata'. Druery describes Stansfield's cultivar as *"a gem of cristation, every point of which will develop into a prothalli if layered, and these prothalli in their turn produce young ferns".*

In the autumn of 1892 another *A.f.f.* 'Clarissima' was discovered, this time in Lancashire, and Druery describes a visit he made in August 1893 to see Mr. T. Bolton of Warton near Carnforth, Lancashire and *"to inspect a new aposporous Athyrium"*.

Mr. Bolton had showed some pinnae of this new cultivar at a meeting of the British Pteridological Society held at Lancaster, in August of 1893, and Druery comments *"on examining the portions of frond submitted, I was at once struck with its strong resemblance to that form of Athyrium filix-femina upon which apospory was first discovered".*

Druery goes on to write about the similarities between what is now called 'Clarissima Jones' and this new cultivar. He was eventually handed the pinnae to inspect. He was told by Bolton *"the spores never seem to ripen"* but when he turned them over, he immediately recognised the peculiarly woolly appearance of the sori which he had seen earlier in 'Clarissima Jones'.

Fig. 4.

Mr. Bolton gave Druery the pinnae, which *"I laid down several pinnae with the excrescences next the soil, and under close culture actual development immediately began, so that in a week or two each sorus had produced a crowd of full-sized prothalli"*.

Dr. F. W. Stansfield was also provided with material from this new cultivar and he wrote that in his case apical apospory was also appearing (this means that prothalli were developing from the tips of the pinnae or pinnules, independently of the pear shaped sori). Druery also found that this apical apospory was occurring in his trials although in some cases the small aborted sori were so near the tips as to give the impression that the prothalli were originating from the tip.

To distinguish *Athyrium filix-femina* 'Clarissima' from this new cultivar found by Mr. Bolton and avoid confusion, it was decided to add 'Jones' (Fig. 5) to the name of the plant rescued by Col. Jones in 1868 and 'Bolton' to the name of this new cultivar (Fig. 6), a nomenclature which still exists to this day.

Unfortunately the progeny from 'Clarissima Bolton' were said to be inferior and "*inconsistent*" as were those obtained from a third 'Clarissima', 'Clarissima Cristatum Garnett'. Unlike 'Clarissima Jones' and 'Clarissima Bolton', which were both wild finds, 'Clarissima Cristatum Garnett' had been bred from an unknown parent; it was however, *"a very pretty slender cristatum"* which had turned out to be aposporous.

Sadly this last 'Clarissima' is no longer with us and has been lost for some considerable time. However, both *Athyrium filix femina* 'Clarissima Jones' and 'Clarissima Bolton' are still with us today so these interesting experiments with aposporous athyriums can be repeated, as was illustrated by Gert-Jan van der Kolk's article in the 2019 Pteridologist. (Volume 6 Part 6. Page 473) Both cultivars are unfortunately rare but 'Clarissima Bolton' is particularly rare, I know of only three fern collections that have this cultivar.

References:

From the Linnean Society archive:

Observations on a singular mode of development in the Lady Fern (*Athyrium filix-femina*). By Charles Druery. Communicated by Dr. J. Murie F.L.S.(read 19th June 1884)

On Apospory in Ferns (with special reference to Mr. Charles T. Druery's observations). By F.O. Bower M.A. F.L.S.(read 18th December 1884)

Notes upon Apospory in a Form of *Scolopendrium vulgare*, var. crispum, and a new Aposporous Athyrium; also in addition phase of Aposporous Development in *Lasteria pseudo-mas* var. cristate. By Charles T. Druery, F.L.S.(read 7th December 1893)

Other references:

Druery, C. T. (1885). On the newly-discovered Phenomenon of Apospory in Ferns. *The British Naturalists Society*

Druery, C. T. (1910). Apospory. *The British Fern Gazette, June 1910, No. 4.*

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https://en.wikipedia.org/wiki/Frederick_Orpen_Bower

Fig. 5. *Athyrium filix-femina* 'Clarissima Jones'

Fig. 6. *Athyrium filix-femina* 'Clarissima Bolton'

Pityrogramma austro-americana and *calamelanos*

Peter Blake

Mr. Parsons's 'golden fern', known as *Gymnogramma chrysophyla* in Victorian times, has had several names since but is now generally known as *Pityrogramma austro-americana*. This fern has a remarkable golden farina on the stipes and back of the fronds (Figs. 1&2).

Fig. 1 *Pityrogramma austro-americana* growing on a bank

Fig. 2 The golden farina on the reverse side of a mature frond

Fig. 3 *Pityrogramma calamelanos*

Fig. 4 The strikingly silver farina of *P. calamelanos*

Fig. 5 Dark brown sori emerging through the silver farina

It is very similar to *P. calamelanos*, a fern with a white farina (Figs. 3&4). This similarity has led to *P. austro-americana* sometimes being referred to as *P calamelanos var. aureoflava*. The white or gold farina on the stipe wears off with age and the dark brown sori emerge through the farina on the back of the frond and can obscure it (Fig. 5).

Both species are common throughout the tropics and I have seen both *P. austro-americana* and *P. calamelanos* growing in similar locations in South India and Sri Lanka, although I have not seen them growing together. Their favoured location is sandy banks or cracks in walls in bright light and they will tolerate direct tropical sunlight for part of the day. Often they are seen growing on the eroded banks at the side of tea-plantations, and growing on flat ground is unusual. This reflects their needs for moisture but free drainage. Generally, they grow to a frond length of 30-40cm or so, but taller ones can be found (Fig. 6)

Fig. 6 An unusually tall *P. calamelanos* with fronds of approximately 1m

They produce large quantities of spores, which spread widely and they can be quite an invasive contaminant in a glasshouse. They are easy to weed-out as the farina is visible with a hand lens when the stipe is only 1-2cm in length. However, their requirement for moisture, high light levels and heat mean that most of the 'volunteers' die off. They don't tolerate transplanting easily and need a large root-run, reflecting their xeric-like growing conditions. However, they will not tolerate drying-out and show little ability to 'resurrect'! Unfortunately, when grown under glass they are extremely susceptible to blackfly. This needs to be controlled with a systemic insecticide delivered to the roots, as sprays or powders tend to destroy the attractive farina.

I have not been able to find any modern-day reference to the existence of a crested variety of either *P. austro-americana* or *P. calamelanos*, although such varieties may exist in private collections. However, the two species are well worth growing for their own attractiveness!

Gymnogramma chrysophylla 'Parsonii'

Colin Adlam

At the Danesbury fernery we have a fascinating Victorian structure, and increasingly a re-interpretation of the garden and fernery planting. Not a single original fern has survived *in situ* but some historic texts gave clues to the ferns originally planted and their varied growing techniques. The fernery creator was Anthony Parsons (Fig. 1), who in the 1850s was a well-respected gardener, a cultivator, and an exhibitor of both his fruits and flowers. In the 1860s he continued showing and added ferns as he brought the fernery into existence. He was mentioned in the Journal of Horticulture and Cottage Gardener in 1865 for showing and gaining first class certificates.

In the *Pteridologist* magazine of 2000 (Vol 3,5, page 112) which can be seen at www.archive.org/details/mobot31753003231567, (for those without *Pteridologist* back numbers). Patricia Watt mentioned that Anthony Parsons was honoured by having the fern *Gymnogramma chrysophylla* 'Parsonii' named for him. No mention was made of the source and this Victorian name is no longer in use, so it was a bit of a mystery as to what this fern could be. The initial internet search did not throw much light on this as there seemed to be no readily available translator of Victorian taxonomy to modern plant names.

Research efforts by others had found the wording, used by Patricia Watt, in Anthony Parsons's obituary, published in January 1881; he died on Christmas Day 1880. Other mentions of the "Parsons fern" have been found showing that Anthony Parsons and his fern were fairly well known in pteridological circles.

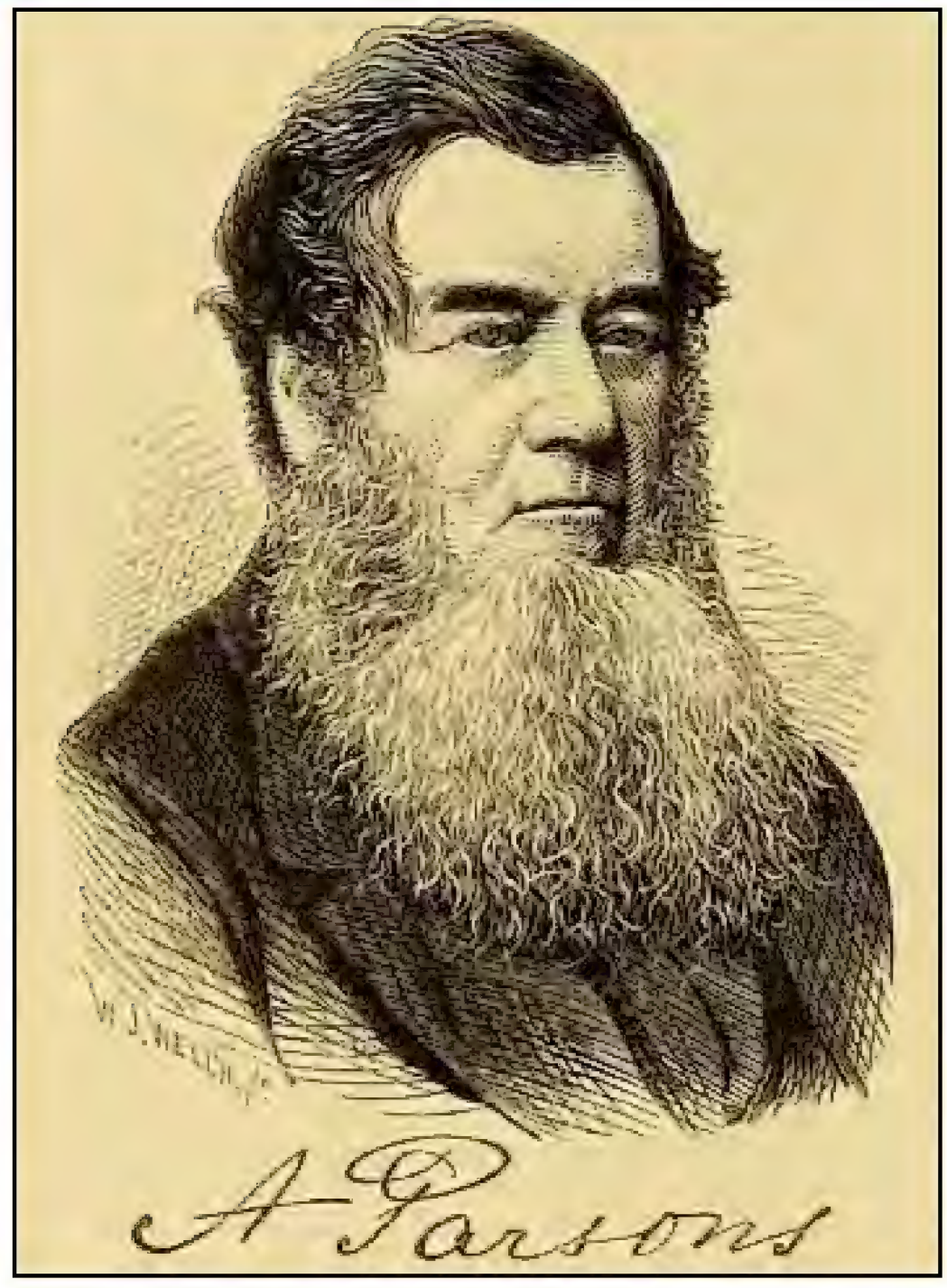


Fig. 1. Anthony Parsons

Peter Blake had a look at some historic books and found the modern name of the original. He feels it is a crested cultivar of *Pityrogramma austro-americana*, a small fern originally from the West Indies, only suitable for hothouse growing but difficult to make thrive. It is part of a group that have glorious golden or silver powder effect on young frond stipes and later a complete covering on the reverse of each mature frond. We now know from other Victorian horticultural publications that Danesbury House did have a "Stove House" so that Anthony Parsons was able to cultivate ferns such as this.

Peter has seen, and grown, the un-crested *Pityrogramma austro-americana* and I have been fortunate enough to see the young version. (See Peter's accompanying article on page 20 for more detail.) He found descriptions in John Smith's book '*Ferns British and Foreign*', 1866, in Lowe, 1867, and in Schneider, 1893, as *Gymnogramma calamelanos var chrysophylla*,

Lowe in his *'Ferns British and Exotic'* vol. 1 page 3, calls it "The King of Golden Ferns"

Benjamin Samuel Williams of the Victoria and Paradise Nurseries, Upper Holloway, London, in '*Select ferns and Lycopods: British and Exotic*', 1873, describes it on page 140 of his catalogue:

"*Gymnogramma chrysophylla Parsonii* – A most beautiful variety, obtained from seed in this country. It retains all the beauty of the species, and, in addition, the apex of the fronds and every pinnae is densely and beautifully tasselled. This plant should be in every collection of tropical Ferns."

In '*The Book of Choice Ferns*', vol. 2, George Schneider describes *Gymnogramma calomelanos chrysophyla* with reference to Lowe, above. On page 242, he also describes *G.c.c.* 'Parsonii' as:

"Beautifully crested form, of comparatively dwarf dimensions, with fronds seldom exceeding 1ft. in length, and covered on their under-side with a beautiful dark yellow powder. They are of a very upright habit, their extremity being formed into a broad but finely divided tassel, while each leaflet terminates in a crest, becoming smaller as they reach the base of the fronds. This variety is very variable in its mode of fructification, some plants producing fronds with more or less flattened crests. It is very liable to damping-off through excessive or accumulation of moisture in the crests of the fronds during the winter, when it must be kept in a particularly dry place, and as close to the light as possible."

So, in conclusion, it appears that our Victorian gardener here at Danesbury Fernery was very good at cultivation and was one of the few people recorded then or since to have cultivated the *Gymnogramma chrysophylla* 'Parsonii'. If any readers have crested variants of the *Pityrogramma* Golden Fern, or the Silver, the author would be grateful to hear from you and perhaps it can again be named for Anthony Parsons.

Anthony Parsons also created at Danesbury a tanked fern bed with clever water drainage that must be unique and which has recently been uncovered and planted with ferns suitable for damp conditions. Like him, we volunteers have found parts of the fernery just too dry for some ferns to thrive. I look forward to writing more on this in the future.

Peter and myself have been unable to locate an image of *Gymnogramma chrysophylla* 'Parsonii' but Schneider describes it as being similar to a dwarf version of *Gymnogramma chrysophylla* 'Grandiceps', shown here in an illustration from Alfred Helmsley, The Book of Fern Culture, John Lane, The Bodley Head, London 1908.

Maintaining a National Collection of *Asplenium scolopendrium* Cultivars

Tim Brock

How do you begin a collection of ferns? For me it started when I opened a box of plants from Fibrex Nurseries. I saw my first *Asplenium scolopendrium* cultivar and I was hooked. It was a magnificent ramosum hart's tongue. This was back in 1988 and I have been collecting them ever since.

The Asplenium cultivars were given national collection status when I was living in Hampshire, about 15 years ago. When I retired we moved to Ceredigion, Wales, and it was a massive challenge to move the collection. We now have about an acre and although it meant there was an unlimited space to plant the ferns, getting them into the ground was another matter, as it was very stony, the soil was thin, and the pH was acid. It took months to plant out the 300-odd pots of ferns. I had to abandon using blood fish and bone because the wild animals were digging up the plants at night, so I just used lime instead.

Fig. 1. 'Conglomeratum' / 'Glomeratum'

Another issue was that the higher rainfall was making some of the fronds go black. I had left a shady garden in Hampshire with rich fertile soil and low rainfall to set up here and it was beginning to be a battle to create the right growing conditions.

In order to have more control over the environment a 30' x 10' shade tunnel with raised beds was erected. This has meant that some of the Asplenium cultivars have been provided with a means to reach their full potential and displayed to their advantage, though the rest of the collection remains growing in the garden.

An initial problem was encountered when a family of voles managed to find their way into the shade tunnel and began burrowing underneath all the ferns. When the plants were watered they would often disappear down the voles' holes! The solution was to temporally remove the plants and line the raised beds with wire netting; so far this has been successful.

Fig. 2. Cross between 'Ramo-marginatum' x 'Perafero-sagittatum'

The scollies appear to grow much better in the shade tunnel than in the garden, which is to be expected. The fronds appear earlier in the Spring and the plants grow to a good size. Cultivars like 'Drummondiae' respond much better to this cosseted environment and also young transplanted ferns grow faster than when left in their pots.

Fig. 3. 'Perafero-sagittatum Brock'

I continue to hybridise the hart's tongue cultivars by mixing the spores to try to create a specific plant with the characters I want, though the process can take several years as they can take a few seasons to fully develop. A faster route of propagating existing cultivars is by taking frond bases and this can also be a way of restarting an old plant. If an old cultivar is not performing well growing new plants from its frond bases can be a way of creating vigorous new ones and quite often healthier cultivars can be grown from frond bases than by divisions. Dividing a good plant can often "set it back" and it may take a season or so to recover.

Fig. 4.'Hydra' a Peraferens with two and a half inch horn

The number of cultivars in this collection has grown by creating new plants by hybridising existing ones and by the generosity of BPS members who have donated or swapped plants; I am in great debt to them.

Plant Heritage holds a number of fern national collections, which is a good way of the public being able to find us and see the cultivars. Some of the collection holders are part of the cultivar group which ensures strong links with the BPS, but it still feels like there is a need for the BPS to acknowledge fern collections in some way as maintaining collections of cultivars is a way of ensuring these precious plants survive in the future.

Fig. 5. A Peraferens with large pockets

Two Possible New *Asplenium lyallii* Hybrids in New Zealand

Pat Acock

Chris Goudey, who lives in Australia, while visiting the surrounding Australian islands noticed many interesting ferns. One of these on Lord Howe Island was a Bird's Nest Fern that everyone had assumed was *Asplenium australasicum.* He realised that it was very different from that species, both in morphology and ecology. He noted also that *Asplenium difforme* and *A. dimorphum* formed an interesting hybrid. Probably the most exciting hybrid he discovered was between *Asplenium australasicum* and *A. polyodont*; with only one ever found, a rare and unusual fern.

Fig. 1. Centre plant *Asplenium lyallii* × *A. obtusatum*

Fig. 2. Detail of mid pinna of *Asplenium lyallii* × *A. obtusatum*

Back home he wondered what would happen if he crossed New Zealand aspleniums with Australian ones, and chose *A. oblongifolium* and *A. bulbiferum*, hoping that the offspring would produce bulbils, which would make it easier to propagate; it did, and he was able to market it under the name "Maori Princess". It was a great success, having hybrid vigour and stood up better than *A. bulbiferum* as it had a stiffer stipe. He named and marketed quite a few other hybrids.

While in New Zealand in November 2019, on a very wet and windy day I visited Nugget Point in the extreme east of the Caitlin Hills in the very south of South Island with my son Richard. We were just going to take in the view from the headland and dash back wet to the car when I stumbled across what looked like a hybrid of *A. obtusatum* with a mysterious other asplenium I could not place. We also found another large clump of this unusual prospective hybrid. In our hurried drenched state the only two other aspleniums we saw were *A. obtusatum* and *A. lyallii.*

Fig. 3. Further detail of mid pinna of *Asplenium lyallii* × *A. obtusatum*

However, two days later, on another of my frequent visits to the Christchurch Botanic Gardens, in the ferny part of the botanic garden I saw a very large colony of what looked at first sight like *A. oblongifolium.* Closer inspection showed it to have another asplenium in its ancestry. I could only conclude it was *A. lyallii.*

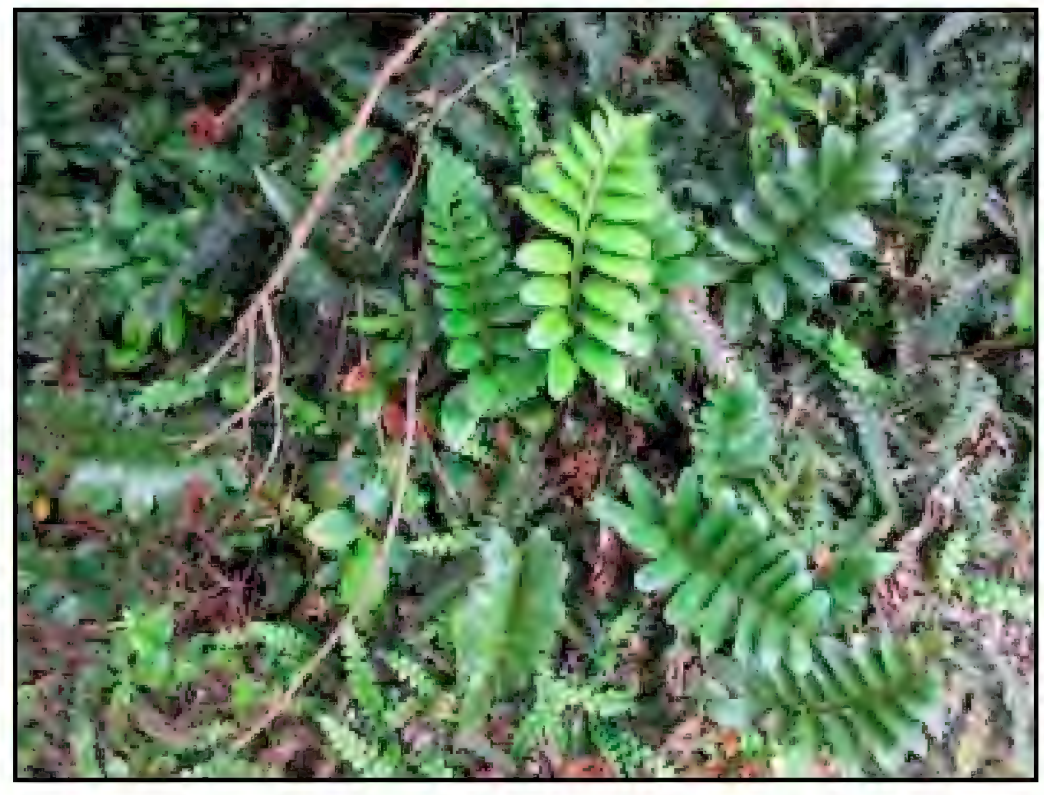


Fig. 4. Centre plant *Asplenium obtusatum*. Note rounded pinnules.

Since I was hurrying to catch the only bus back and a forecast storm was approaching, I thanked the girl who had directed me to the fern garden and asked her to pass on the information. She told me the chap who knew the ferns was but 50 yards away so I met Luke Martin, who was very busy trying to complete a task before the oncoming rain, but asked if I could show him the hybrid.

Fig. 5. Large plant of *Asplenium lyallii* × *A. oblongifolium*

He was very interested so he hurried along with me trying to refind it. As we went he was telling me about the other hybrids of *A. bulbiferum*, which reassured me that he knew these ferns well. Time was running out for the both of us just as I found the right corner on this maze of paths. Luke mentioned that he had a feeling before that this plant was different. The corner where it was had had limestone boulders added especially for *A. lyallii* and since this many-crowned hybrid was growing around and over limestone boulders it fitted in exactly with my first thoughts about it. The conditions were the same as those where I had seen *A. lyalli* on my first visit to NZ in 2000.

Fig. 6.. A further crown of *Asplenium lyallii* × *A. oblongifolium*. Note variable pinnules of intermediate between the two parents

On returning to Oxford (New Zealand) and consulting my daughter-in-law's copy of Brownsea and Smith Dodsworth, *New Zealand Ferns and Fern Allies* the following day, I was beginning to doubt the first diagnosis but am fairly certain about the second. However, the first prospective hybrid gave me more hope when I was pressing it since It had many of the characteristics of *A. obtusatum.* Despite *A. lyallii* being a very variable plant as it matures. I have seen many *A. lyallii* and have watched my two in the greenhouse over a number of years. Perhaps the extreme conditions on the headland had a peculiar effect on the said plant. Hopefully the pictures will lead you to come to your own conclusions.

Fig. 7. Detail of pinnae of *Asplenium lyallii* × *A. oblongifolium.*

Fig. 8. Frond of *Asplenium oblongifolium* in author's greenhouse

Fern Hunting for Polypodium Cultivars - Why Are Finds Historically Sporadic?

Martin Rickard

When I first joined the Society, my interest was purely in the rarer species and trying to see as many of them as possible growing wild. Aided mainly by Victorian books I found quite a few, but it did not take long to realise I was running out of target species to hunt with any realistic chance of success. I had become very friendly with Jimmy Dyce during this early part of my membership, and he increasingly told me about the existence of wonderful cultivars. Eventually his enthusiasm rubbed off - gradually I became interested!

One of my questions to him, and others, was why are no new cultivars being found these days? Before I was a member, Society excursions (usually only one or two a year) were often directed at hunting cultivars. Scans through the *British Fern Gazette* for the 1950s and 1960s show very few cultivars were found, and attendance numbers were usually well below ten, most elderly.

Fig. 1. Two of the greatest fern men. Dr F.W. Stansfield (left) and Mr T.E.Henwood (right) in a country lane.
From the British Fern Gazette Vol.7, No. 4, 1937.
Note the attire, tie, perfectly creased trousers, immaculate shoes, etc. etc.

This type of hunting was targeted at *Polystichum setiferum*-rich areas, mainly in East Devon, the area where Moly had found his greatest treasures 70 or 80 years before. A glance at Fig. 1 makes it clear great athleticism was not on offer! Successes were few.

Why were wild find successes so few? Different reasons have been put forward.

1. Radioactivity in underlying rocks might increase the frequency of mutants, but it would surely be fairly constant. In addition there is no evidence that the areas where variation is most frequent have produced the most cultivars.

2. Weather cycles. Possible.

3. All were collected during the Victorian Fern Craze, there were none left. Possibly true for *Polystichum setiferum* hot spots. Perhaps the earlier generation, led by Moly, had really taken all the best cultivars out of the lanes.

Polypodium cambricum is a special case. It is also most easily hunted in autumn, not a normal time for fern explorers. It is an early colonist, and unless maintained artificially it can dwindle and disappear quite quickly. For example, the site of 'Grandiceps Jill' on a grassy clifftop on the Mediterranean coast of France had a good scattering of the species. Visited 15 years later no *P. cambricum* persisted anywhere near the original find. Gorse and brambles had taken over. The opposite can also be true. 'Cristatum Isabella' in Eire was easily spotted while I was strolling along the road, but P.B. O'Kelly, who lived along the same road less than two miles away, never recorded a single crested polypod, but did offer for sale quite a lot of far less interesting varieties among his other numerous polypod finds. Most plants he offered were wild finds collected to order from the Burren, which he used as his personal nursery. I find it inconceivable that he had not walked past this spot hundreds of times. Had it been there he would surely have seen it. Sadly, another example of being overcome by aggressive vegetation is a mile or so further up the same road at Corkscrew Hill. The cultivar I have named 'Corkscrew Hill' dwindled over three or four years before disappearing altogether. It had not been collected out; it was just nature.

4. One week a year is not much, therefore not much hunting was done. We now have many meetings, which surely helps.

5. Within Polypodium, *Polypodium cambricum* is the species most likely to sport. It is rarely encountered near centres of population. It thrives in sheltered or climatically mild districts on limestone, mainly in the south west and Eire; not so much on the higher limestone pavements of, for example, Hutton Roof or Whitbarrow in the south east Lake District, which tend to be more attractive to fern species enthusiasts. Suitable sites at lower levels in the south east of the Lake District, where several classics of the Victorian period had been discovered, were sadly less often botanised. Recently this has changed, and in 2017 a truly wonderful cultivar, 'Omnilacerum Burntbarrow', was found in this region at close to sea level. (See *Pteridologist*, Vol.6, Part 6, pp. 505-506, 2019).

6. The average age of hunters was probably over seventy and they were hardly well equipped, usually wearing suits with waistcoats, often with an Albert chain to a pocket watch. They strolled roads chatting having an enjoyable time but I wonder how hard they looked? Age today is similar at meetings, perhaps we are fitter! Again, see Fig.1 above.

7. Another problem was the Society membership was

Fig. 2 *Polypodium cambricum* 'Omnilacerum Burntbarrow'
Photo: Julian Reed

small until Jimmy Dyce became Secretary, Treasurer, Meetings organiser etc. etc. His enthusiasm boosted membership but surprisingly did not do much for cultivar finds. Nevertheless, throughout the rest of the twentieth century our membership kept rising, but maybe the interest in cultivars just was not there. Most were only interested in species.

Fig. 3. A wall in Killarney covered with the beautiful broad fronds of normal *Polypodium cambricum*. Not many yards along the wall from this spot 'Cambrian Killarney' was spotted by Mark Jannink (Fig. 5)

In the 21st century cultivars have started being found again, but I do not get the impression that good finds are common. I have been extremely fortunate in being invited over to Eire each autumn for 15 years to stay with Jim and Val Dennison. It is of course a wonderful holiday but virtually all daylight hours are dedicated to hunting *P. cambricum* cultivars, usually 3 or 4 full days a week. Locally around south and west Eire limestone is common, far more abundant than anywhere else in the British Isles. The rock is used to make mile upon mile of wonderful *P. cambricum* crowded walls! The climate is wet and relatively mild; everything is perfect for *P. cambricum*, but some weeks we finding nothing more than rather ordinary 'Semilacerum'. I am sure there are plenty more treasures out there. All you have to do is look - normally shuffling slowly along country lanes trying to spot anything different. Just like Stansfield and Henwood above!

Of the best 52 cultivars I have listed below four are *P. vulgare* variants and only one is *P. interjectum*. The remaining 47 are cultivars of *P. cambricum*. Only 4 selected cultivars were collected in the twentieth century, as opposed to 34 in the nineteenth and ten so far in the twenty first. So what has changed?
Basically, I believe nothing! The cultivars were there but very little targeted hunting took place.
Evidence of the strange ups and downs of success over the years is well-shown by looking at the dates of finds among the polypodies. In the table I have selected only wild-find cultivars I consider of significant merit. This list excludes spore-grown raisings. For example, all the wonderful cultivars of the Cornubiense group can be traced back to just one, *Polypodium vulgare* 'Elegantissimum', a wild find in 1868.

Fig. 4. The modern cultivar hunter (Jim Dennison) lured into dangerous situations by a luxuriant bank of *Polypodium cambricum* in 2008

Fig. 5. *Polypopdium cambricum* 'Cambrian Killarney' found in 2012

Fig. 6. *Polypodium cambricum* 'Cambrian Richard Kayse' found in 1668

Fig. 7. *Polypodium cambricum* 'Cristatum Goblin' found in 2011

Fig. 8. *Polypodium cambricum* 'Furco-macrostachyon' found in 2013

Fig. 9. *Polypodium cambricum* 'Furco-cristatum' found in 2013

The following is a list of wild finds:-

1668 Cambrian Richard Kayse

1730 Cristatum

1806 Semilacerum

1848 Omnilacerum Bennett

1854 Grandiceps Parker

1856 Cristatum Perry

1858 Decompositum

1859 Propinquum

1860 Bifido-lobatum

1860 Pluma

1860 Ramosum Hillman *P. vulgare*

1861 Pulcherrimum Addison

1862 Brachiato-serratum

1864 Omnilacerum Benbow 1

1864 Omnilacerum Benbow 2

1864 Omnilacerum Warburtonii

1865 Cristatum Morleyi

1865 Serra

1866 Omnilacerum Cristatum Benbow

1866 Paigntonense

1867 Bifido-cristatum *P. vulgare*

1867 Elegantissimum *P. vulgare*

1868 Cambrian Oakeleyae

1868 Cornutum

1869 Semilacerum Robustum

1870 Brachiato-serratum Parsons

1871 Cambrian Prestonii

1873 Glomeratum Mullins *P. interjectum*

1873 Omnilacerum Aldrenii

1874 Cambrian Barrowii

1875 Cambrian Hadwinii

1876 Cambrian Conwy

1876 Grandiceps Foster

1880 Cambrian Whilharris

1886 Diadema

1890 Macrostachyon

1890 Semilacerum Falcatum O'Kelly

1896 Cornutum *P. vulgare*

1914 Omnilacerum Superbum Hawkins

1949 Cambrian Capel Curig

1983 Hornet

1985 (Semilacerum) Carew Lane

2002 Grandiceps Jill

2009 Abruptum Savage

2009 Cristatum Corkscrew

2010 Cristatum Isabella

2011 Cristatum Goblin

2012 Cambrian Killarney

2013 Furco-cristatum

2013 Furco-macrostachyon

2015 Grandiceps Ardfinnan

2017 Omnilacerum Burntbarrow

The Japan Tour (Part 1)
Alice Taylor, Daniel Yansura, Paul Ripley, Pat Riehl, Pat Acock

Thursday 31 October Arrival Alice Taylor

Introduction

I had not been on a specialised Japan tour before (unlike my fellow Brits on the trip) so I did not know what to expect from this guided tour of the ferns of southern Japan. However, I can say sincerely that any expectations I did have were met and surpassed; we visited sites of stunning natural beauty and met an incredible diversity of ferns. The tour was excellently planned and expertly guided thanks to Kazuo Tsuchiya's leadership and the assistance of Asher Ramsah, Dr. Yamazumi and Dr. Hori.

Before setting out, all I knew was that I wanted to see as much of the diversity of native Japanese ferns as I could in the wild, and see the different habitats in which they grow – especially the more subtropical ferns (e.g. *Cyathea spp.*) that you can only see in Japan's more southerly islands. The tour would certainly deliver in this respect, but also in so many more ways. Almost every day would start with a good hearty breakfast and Yamazumi-sensei sharing his fern-wisdom with the group before visiting some of the most miraculous natural sites I have ever had the pleasure to see. Although I have travelled through Japan before in search of plants, I have never been on a trip with such a precise focus on ferns and certainly not travelled with such a wonderful (and wonderfully weird) group of fern enthusiasts and experts. A very successful tour indeed!

Friday 1 November Travelling to Shikoku Island Daniel Yansura

After a great Japanese breakfast at the Nikko Narita Hotel, we took a short bus ride to the railway station, and then a rather long commuter ride to the Haneda Airport outside Tokyo. Our flight to the Ryoma Airport in the Kochi Prefecture on Shikoku Island was short and pleasant, and on arrival we met up with Mr. Ichiro Yamazumi, who most of us knew from previous fern tours to Japan. Mr. Yamazumi is a wonderful fern expert who accompanied us on our earlier trips to the southern half of Japan; he would share his knowledge with us this trip also.

At the airport we boarded a small coach and set out to spend the afternoon at the Makino Botanical Garden and Herbarium. On the way there, Mr. Yamazumi passed out packages with a list of ferns we would probably see, and topology maps for each day's outing. We all began to study the list for ferns we would be excited to find, while at the same time looking out our window to admire *Dicranopteris linearis*, *Diplopterygium glaucum*, and many other ferns unidentifiable from the coach. At the botanical garden, we met the director who then led us to a large building that housed the herbarium and a number of labs, some of which are involved in plant DNA analysis. There were several ferns that excited us on this short walk to the herbarium, including *Osmunda banksiifolia*, *O. japonica*, *Lepisorus thunbergianus*, *Haplopteris flexuosa*, *Leptochilus ellipticus*, *Neolepisorus ensatus*, *Lemmaphyllum microphyllum*, *Selliguea hastata*, and *Odontosoria chinensis*.

In the herbarium we were told that there are 500,000 specimens in their collection, of which 300,000 are identified. Two pressed and mounted ferns were sitting on a table for us to look at; *Asplenium coenobiale*, a very un-fern like looking plant; and *Lindsaea simulans*, which looks a lot like an *Adiantum*. We also noticed on a shelf the two volumes of The Standard of Ferns and Lycophytes in Japan by J. Ebihara and F. Kasetani; many of us had purchased these extensive reference books on the 2016 Japan Fern Tour.

With much of the day devoted to travelling, we didn't have enough time to see the whole botanical garden. On the walk to the conservatory, however, we did pass a display of mostly ferns in a sheltered wooden structure fitted with misters to maintain high humidity. We admired *Asplenium ritoense* in this display, along with *Lemmaphyllum microphyllum*, and *Odontosoria chinensis*.

The large conservatory has a beautiful entrance, with high rock walls that provide a surface for climbing plants and epiphytes, many of them ferns. On the ground grew a large patch of the simple-leaved *Neolepisorus ensatus*. As the entry opened up into a larger room, an *Angiopteris lygodifolia* with 4m fronds became the centrepiece, dwarfing Fernando Orellana standing next to it.

Fig. 1.. *Angiopteris lygodifolia*
Makino Botanic Garden Conservatory with Fernando.
Photo: Dan Yansura

Finally we entered a large room with rock walls, a waterfall, and two small ponds. The tree ferns *Cyathea lepifera*, *C. spinulosa*, and *C. podophylla* grew to several metres tall, and, with the sound of falling water, provided a wonderful scene. On a rock shelf we saw *Phlebodium descurrens* with its large cascading coarsely-divided fronds, and near the ground grew a beautiful specimen of *Asplenium wrightii*.

With the day quickly fading, we headed back to our coach and then drove into the city of Tosa for our stay at Kanpo no yado Ino Hotel.

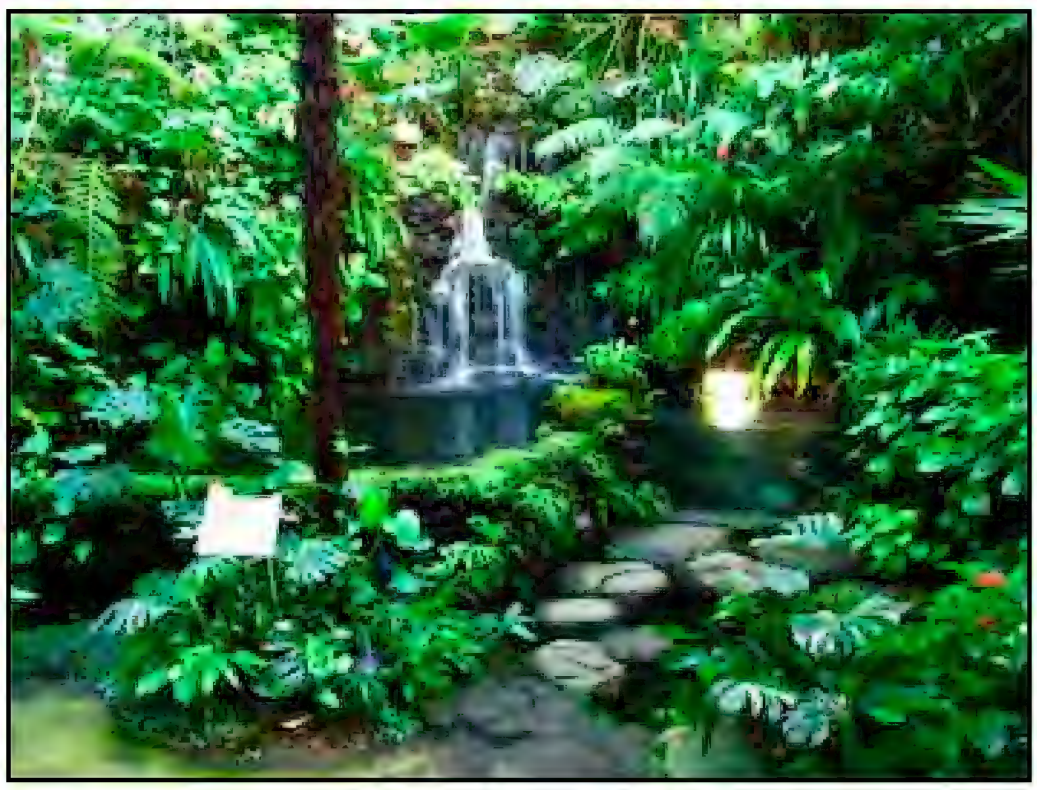


Fig. 2. Makino Botanic Garden Conservatory.
Photo: Fernando Orellana

Saturday November 2 Paul Ripley

On a cloudless morning, we left our hotel, picking up Dr. Hori from the station in Sakawa and making a brief stop at the Yokogurayama National Forest Museum. We noticed *Botrychium virginianum* by the car/coach park.

Yokogurayama contains the only genuine ancient (oak) forest in Japan, and also contains the oldest limestone in Japan. It was originally under the sea, and the limestone derives from coral reefs. It contains some rare plants, such as the cricket orchid, and bioluminescent fungi. It is of great geological interest, being part of the Gondwana "continent" before its separation. It contains 480-million-year-old plant and animal fossils that are found elsewhere only in South China and Australia (and maybe Antarctica).

Fig. 4.*Cyathea lepifera* a most beautiful tree fern reflected magnificently in the lake behind Okawa Dam.

Photo: Dan Yanzura

We followed a trail up to about 800m and noted *Blechnum niponicum*, *Plagiogyria euphlebia*, *P. japonica*, *Dryopteris hondoensis*, *D. uniformis*, *Polystichum tagawanum*, *Deparia conilii*, *Hymenophyllum barbatum*, somewhat desiccated and growing with a *Selaginella* and a *Crepidomanes*. Particular ferns and allies that caught my eye were a *Huperzia*, *Polystichum tripteron*, *Cyrtomium fortunei* var. *clivicola*, several *Athyrium* species (*A. iseanum*, *A. wardii* and *A. decurrentialatum*), and the distinctive *Dryopsis maximowicziana* with stiff white hairs on the stipe and rachis. *Lepisorus onoei* (creeping) and *L. thunbergiana* were common on rocks, often with *Lemmaphyllum microphyllum.*

Other ferns of interest were *Davallia mariesii* (seen from a distance growing high in trees), *Thelypteris laxa*, *T. japonica* and *Acystopteris japonica*. We saw *Diplazium metteneanum*, and possibly the hybrid with *D. deciduum*, since, in Mr. Yamazumi's opinion, the hybrid was better able to withstand the dry conditions here. We stopped to admire the view over a deep

Fig. 3. A frequent warning on trails

Photo: Fernando Orellana

Fig. 5. Chitra with her new best friend

Photo: Pat Acock

valley before descending quickly to lunch in a typical Japanese restaurant below the Forest Centre.

We returned to the Forest Centre after lunch and had a most interesting guided tour of the varied exhibits dealing with the geological history, natural, and social history of the area.

We then had limited time before the light faded for the day to visit the beautiful Otaru Falls. There were many ferns here, and we would have liked to have spent more time on the trail to the falls. Highlights were *Dryopteris atrata* (one plant kindly found for us by Dr. Hori), *Neocheiropteris ensata*, *Leptochilus ellipticus*, *Lepisorus thunbergianus*, *Coniogramme intermedia*, *Macrothelypteris torresiana*, *Hymenophyllum barbatum* and, according to Mr. Yamazumi, *Crepidomanes latealatum* with false veins, at least 2 species of *Pteris*, including one very large, *P. terminalis* var. *fauriei*, and *P.semipinnata*, *Deparia lancea*, *Microlepia marginata*, *Asplenium ruprechtii* and *Diplazium wichurae*, which Pat and I mistook for an *Asplenium*.

A very full and interesting day was rounded off by a visit to the onsen, and a superb meal at our traditional Japanese hotel. Sadly, some of us found prolonged sitting at table on the floor somewhat uncomfortable.

Sunday 3 November Nakatsu Valley Pat Riehl

On the way to the morning's destination, the Nakatsu Valley, we met our guides, Uka-san and Hori-san. The Nakatsu Valley is a limestone gorge carved out over millions of years by the Niyodo River. The goal for some of us and the tourists is to see the Uryu Falls, which translates in English as the Rain Dragon Falls. A series of paths, walkways and steps led us safely through the gorge where the boulders were mammoth and covered in moss and ferns. The crystal-clear water was coloured Niyodo Blue, somewhere between blue and green. It was magical! We were told there are 100 different ferns in this area and many of us recorded over forty. Within a very short distance there were *Asplenium normale*, *A. anogrammoides*, *A. wrightii* and *A. prolongatum*.

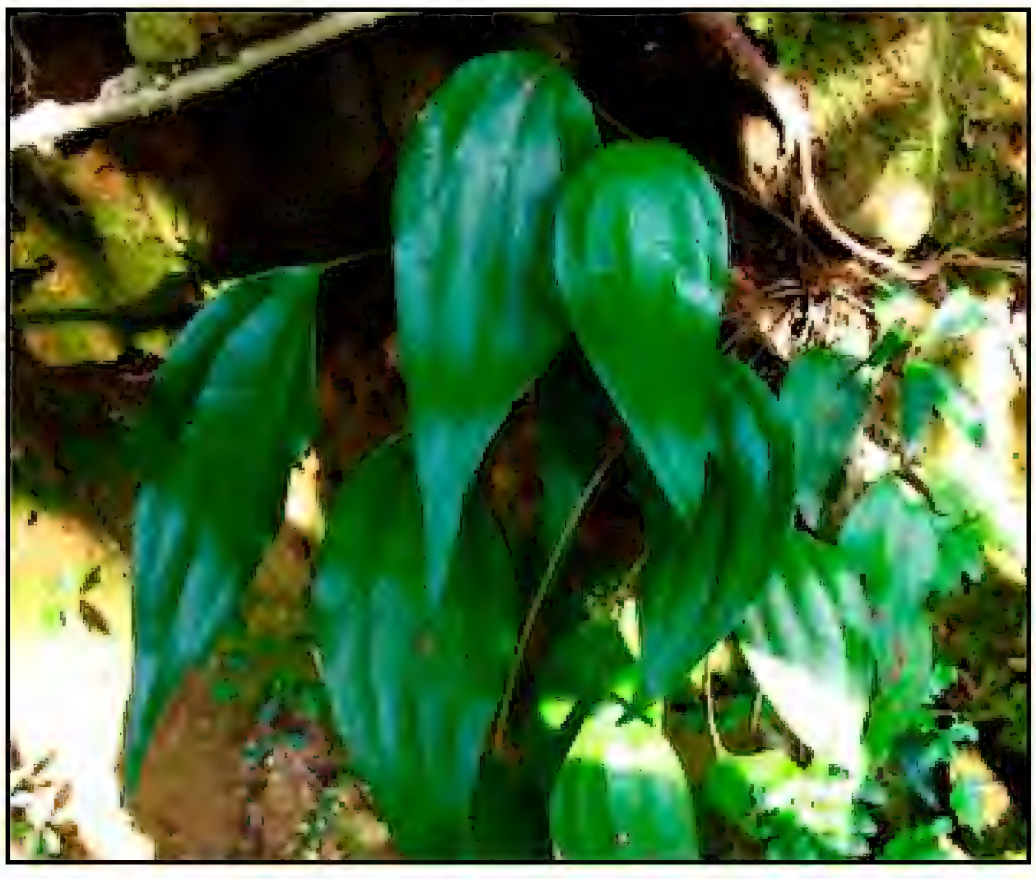


Fig. 6. *Cheiropleuria integrifolia* was less rare the further south we have explored in Japan. Here at Kinsakubaru.

Photo: Dan Yansura

The greatest delight for me was seeing filmy ferns again; *Hymenophyllum badium* with close by *H. barbatum*, probably the easiest to identify because of its rough frond texture. *Vandenboschia kalamocarpa* and the rare *Crepidomanes makinoi*, similar to *C. latealatum*, were amongst the filmies I was grateful Mr. Yamazumi identified for us, because there has been so much confusion about identification and renaming in the Hymenophyllaceae recently. The polypodiums were represented by *Goniophlebium niponicum*, out of reach, but the fronds would have been soft to the touch and with a trailing silver-blue-green rhizome. There was also *G. niponicum* hanging from the side of a bridge as we walked back for lunch. During lunch Alice noticed the cooked fish group were eating botrychiums. Some of the other notable ferns included *Arachniodes amabilis*, *Diplopterygium glaucum*, *Dryopteris uniformis*, *Anisocampium sheareri*, *Plagiogyria euphlebia*, *Deparia unifurcata*, *Selliguea engleri*, *S. hastata*, *Diplazium hachijoense*, *Neolepisorus ensatus*, *Arachniodes standishii* and *Asplenium ritoense*.

In the afternoon we went to see a bridge, but not just any bridge (33°34'22.4"N, 133°21'17.5"E). This bridge was designed for the water to pass over it without damaging the structure during monsoon season. It is a narrow one lane bridge, nearly 100m long and about 6m wide, with no railings but a slight road kerb with cut-outs to allow water to run off. For walkers there are three or four half-circle extensions at the bridge edges for them to step out of the way of cars. Of course, we were also looking for ferns and found *Selaginella involvens* and *Lemmaphyllum microphyllum*; two genera seen everywhere along with *Dryopteris hikonensis*, *Asplenium anagrammoides* and *Lepisorus onoei*. After we checked into our hotel a large group of us decide to go to dinner together. After calling around we end up at a small family restaurant. We had our own room upstairs, but I think we were more than they could accommodate so we were asked to leave. I admit we did seem to have a hard time making decisions. It seemed wise to separate and go in smaller groups for dinner after that.

Monday 4 November Pat Acock

The fourth day of our tour concluded our Kochi Prefecture experience. It was mainly autoferning, but we saw many rarities. The first roadside stop

Fig. 7.. One of two rare Aspleniums on a limestone formation in a cutting on the roadside, *Asplenium ruprechtii.* Photo:

Dan Yansura

(33°37'41.7″N, 133°30'48.6″E) was in limestone country, where the limestone was in fairly distinct near-horizontal layers. Two beautiful small aspleniums grew here. It was difficult to find mature perfect specimens to photograph. Gradually our eyes adjusted and along the boundary of two layers we saw many immature plants just waiting for wetter weather to take the opportunity of developing. *Asplenium coenobiale* and *A. ruprechtii* were the two little gems.

Fig. 8. Pat Riehl stands by one of the two Polystichums, *Polystichum craspedosorum* and *Polystichum deltodon*. with a creeping rhizome amongst rocky debris in this corner of a dry riverbed.

Photo: Chitra Parpia

We did see *Polystichum craspedosorum* at this site, but further down the road (33°37'41.7″N, 133°30'15.8″E) we climbed up a river valley and were led onto the riverbed to observe much larger plants of not only *Polystichum craspedosorum* but also *P. deltodon*. Both of these polystichums do not form a crown but are on creeping rhizomes. This was a rich area for ferns, but we were unable to spend much time here since we were on a tight schedule culminating in an evening flight out.

Racing onwards on this busy road we had to park in a small hamlet and walk 600m back up the road where a small layby gave us some protection from the traffic. Here on a rocky cliff (33°37'33.2″N, 33°30'15.8″E) with a sturdy wire framework protecting the road and us from falling rocks was a rarity in *Pteris kidoi*. I am sure somewhere along the cliff and on more dangerous parts of the road we might have found more of this plant but with the time constraints we were reduced to pointing our cameras through the mesh at the few plants of *Pteris kidoi* we could see, engage our telephoto lenses, and hope we had a picture. Ironically in the hamlet on a house wall were large quantities of the similar fern *Pteris multifida.*

Fig. 9. *Thelypteris acuminata* our most common fern

Photo: Pat Acock

Moving on, our coach driver knew a place where we could eat a late lunch and very good it was too, finished with a chocolate ice-cream. We then made our way to our last stop of the day. We had to borrow some wellington boots from this booth and walk about 100m inland from the sea to the entrance of the Ioki Cave. Being a little bit of a sceptic, I was doubtful about what to expect along this tunnel with a channel for the water beside the raised path.

Fig. 10. The Ioki Cave and Gorge with floor to ceiling ferns.

Photo: Chitra Parpia

On emerging we found a deep cavernous gorge simply dripping with water and ferns (33°29'25.0″N, 133°5'56.6″E). Even the interpretation boards named the ferns. The gorge remained deep and very humid and full of the most luxuriant ferns growing at their very best. Curtains of *Diplazium wichurae* greeted us and the raised floor and banks alongside the river abounded in *Osmunda banksifolia*, *Neolepisorus ensatus*, *Plagiogyria euphlebia*, *Leptochillis ellipticus* with very large *Asplenium ruprechtii* growing on the ledges and an unidentified *Trichomanes* on the tree trunks, as well as *Hymenophyllum hondoense.* We hurried on to have a view of the terminating waterfall before dashing back to the coach to catch our flight to Itami Airport.

Continued on page 61.

Polystichum × *ida-klodeae* (*Polystichum proliferum* × *Polystichum atkinsonii*), a New Fern hybrid

Rolf Thiemann

Fern hybrids are often plants of interest in the garden, but by reason of their sterility most hybrids are difficult to propagate. Dividing the rootstock is often the only way providing that the plant willingly produces new crowns; the genus Polystichum is no exception. Propagating by *in vitro* culture is very difficult and can be very expensive. Fortunately some species of Polystichum produce bulbils and usually bequeath this property to their hybrids. Such bulbil-producing species, widespread in culture, are *Polystichum andersonii*, *Polystichum proliferum*, and many cultivars of *Polystichum setiferum*. One group of Polystichums that are closely related to the genus Cyrtomium (e.g. *Polystichum lepidocaulon*, *Polystichum craspedosorum*) produce bulbils too but are rarely seen in gardens. Bulbils allow a slow but easy way to propagate hybrids. In this article, I describe an artificially-made Polystichum hybrid that will find its way into the gardens of fern enthusiasts.

I crossed *Polystichum proliferum* with *Polystichum atkinsonii* (Fig. 1). Both species are dark green and have leathery fronds. *Polystichum proliferum* is bipinnate to tripinnatified (Fig. 2) and *Polystichum atkinsonii* pinnate (Fig. 3).

Polystichum proliferum is a medium-sized fern with fronds no more than 50cm in length in our garden. *Polystichum atkinsonii* is a very small species resembling *Asplenium trichomanes* at a quick glance. Both species

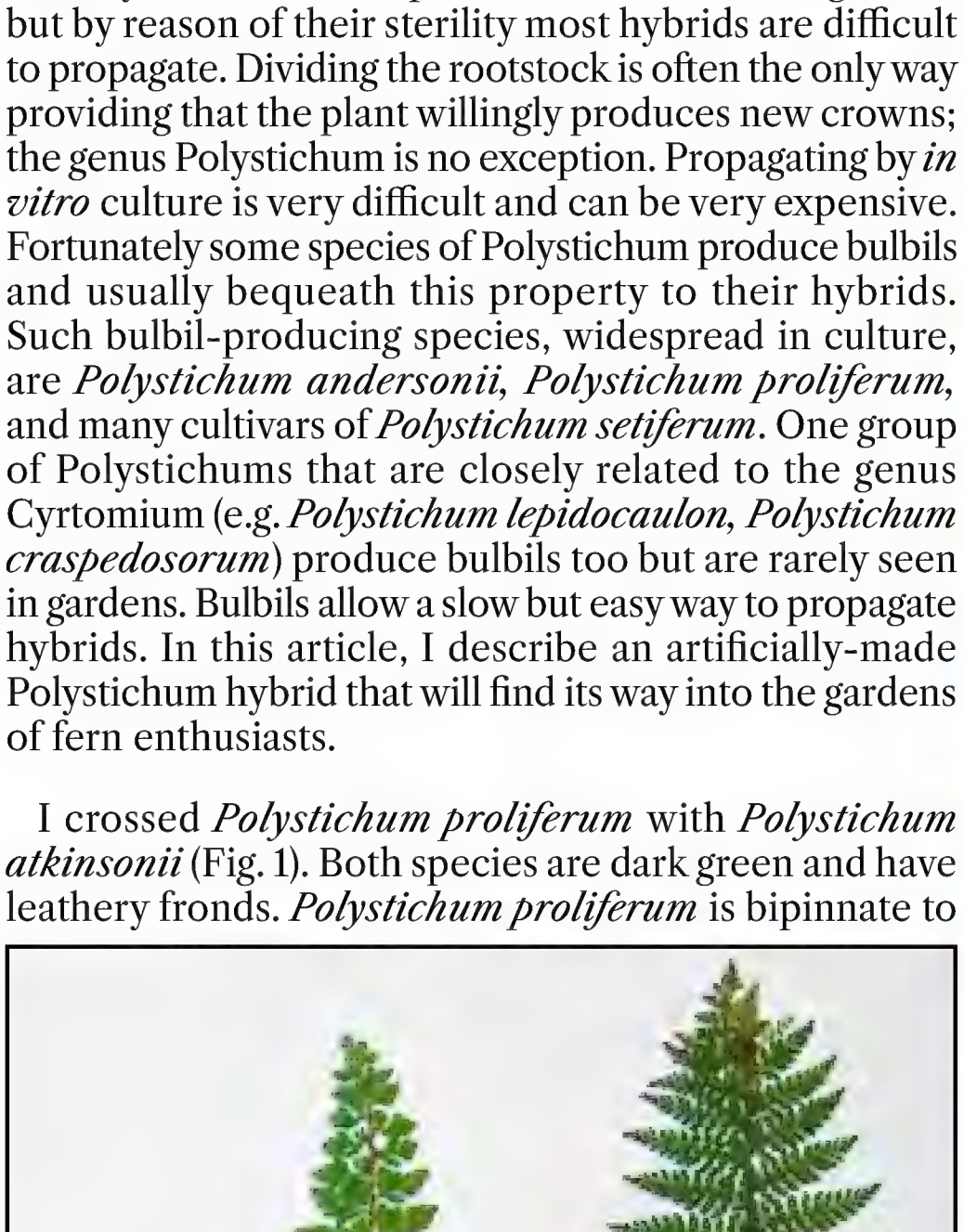


Fig. 1. The hybrid between its parents

Fig. 2. *Polystichum proliferum*

Fig. 3. *Polystichum atkinsonii*

Fig. 4. *Polystichum proliferum* with bulbils

produce bulbils, *Polystichum proliferum* willingly (Fig. 4) but *Polystichum atkinsonii* only rarely, and then mostly only rudimentary ones that often do not flourish.

Both Polystichums are plants of the mountains; *Polystichum proliferum* is a plant of the Blue Mountains in Australia and *Polystchum atkinsonii* is a plant of high elevations, growing in the Himalayas and other regions in East Asia, such as India, Bhutan, Nepal, China, and Japan, up to 4000m altitude. This species, therefore, is not a fern for dry and warm places in the garden. Many years ago I received spores of *Polystichum atkinsonii* mislabelled as *Polystichum stenophyllum*. *Polystichum atkinsonii* occurs under the name *Polystichum stenophyllum* in some European gardens but this is another species that is not in culture in Europe as far as I know.

The fronds of the hybrid reach 30cm and are small lanceolate, dark green, leathery, and glossy (Figs. 5,6,7,8). Well-developed bulbils are found on about 50% of the fronds (Fig. 9). Every year some plants develop sufficiently to make new plants. Cultivation is easy. As with parents, the hybrid plants should be grown in good light but not spend the whole day in full sun. If possible, a cool place is best. In our garden it grows in neutral soil. As with *Polystichum proliferum* the bulbils should not be removed in autumn to cultivate indoors but should stay on the mother plant until late the next spring and only need protecting from the worst frosts to avoid frost scorching. The bulbils are sensitive to winter culture indoors. I have named this hybrid for our grandchild, Ida Klode.

Fig. 7. *Polystichum* x *ida-klodeae*

Fig. 5. *Polystichum* x *ida-klodeae*, close -up

Fig. 5. *Polystichum* x *ida-klodeae* in the rock garden

Fig. 6. *Polystichum* x *ida-klodeae*

Fig. 9. The bulbils of the hybrid

Henry Bradbury (1829-1860) and his Fern Nature-Prints – New Discoveries

Adrian Dyer

Henry Bradbury is well known to fern enthusiasts for his Nature-Prints of ferns in "The Ferns of Great Britain and Ireland" (Moore 1855/56, re-issued in 1857). Containing 51 folio plates of life-size images of ferns to illustrate the text by Thomas Moore, this is one of the most remarkable and memorable fern books ever produced (Fig. 1).

Fig. 1. Two plates from Moore (1855/56).
Left: Plate XLI *Polystichum angulare* (= *Polysticum setiferum*), typical of plates of large fern species. The 5p coin provides a scale.
Right: Plate XII, typical of plates of small fern species *Asplenium ruta-muraria, Asplenium septentrionale*, and, between them, *Asplenium germanicum* (= *Asplenium* x *alternifolium*), the hybrid between *Asplenium ruta-muraria* and *Asplenium. trichomanes* subsp. *quadrivalens.*

It was discovering this book (and buying it for £3 10s) in 1959 in the basement of Blackwell's in Oxford that started my interest in nature printing. Bradbury later produced 124 octavo plates (122 full plates and two title-page vignettes (Fig. 2)) for Moore's two-volume "The Nature-Printed British Ferns" (Moore 1859/60, re-issued in 1863). The Nature-Prints were produced, and the books were printed and published, at Henry's father William Bradbury's printing and book-binding works, Bradbury & Evans of Whitefriars, London. In 2015, I published a detailed account of Henry Bradbury's life and Nature-Printing activities in Huntia (Dyer, 2015).

Bradbury's Nature-Printing technique is essentially the same as that pioneered at the Staatsdruckerei in Vienna under the supervision of the Director, Alois Auer. This process consists of making an impressed image of the specimen under pressure on a polished lead plate, then making a copy in relief by electrolytic deposition of copper on the lead plate, and then making from that 'master' relief plate, one or more copper copies from which prints can be made by the intaglio method. This involves inking by hand every time an impression is taken, as for an engraving. (A copy of my 2005 article has been deposited in the BPS archives; it is also available online and I can provide an offprint as a PDF on request. Corrections to that article are listed in a footnote below.)

The following notes provide new information that has become available to me over the last 5 years.

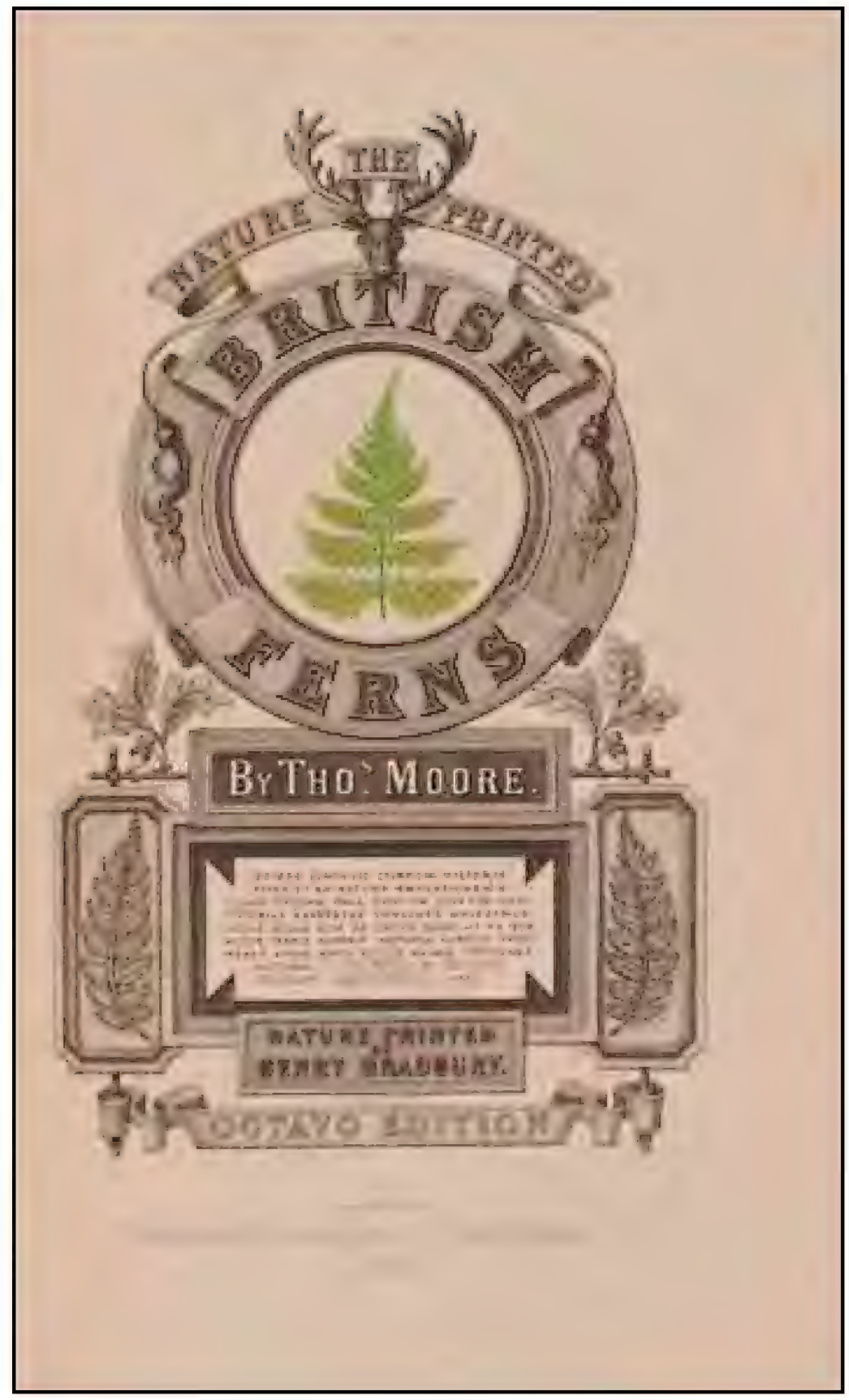


Fig. 2. Decorative title page of volume 1 of Moore (1859/60). The decorative title page of Volume 2 is identical apart from the vignette which is of Maidenhair Fern. Although both volumes are dated 1859 on these title pages, Volume 1 was published in October 1859, and Volume 2 in June 1860. The same decorative title pages were used unchanged for the re-issue (Moore, 1863) but the date 1863 was added at the bottom of the second title page

1. Discovery of another copy of Bradbury (1854), "A few leaves represented by Nature-Printing...."

Bradbury's first published Nature-Prints were issued as sets of 14, 21, or 33 unbound prints without text. Each set was an individual selection from a list that initially consisted of 33 plates, later increased to 39. Five plates are of ferns; the remainder are the only Nature-Prints of flowering plants that Bradbury published (Fig. 3 overleaf). I described (Dyer, 2004 and 2015) the 19 complete and incomplete sets of Bradbury (1854) that had been traced by 2015. Some sets have been bound, not necessarily by Bradbury & Evans (Fig. 4 overleaf), since they were issued, while some sets are still loose. Most are held in museums and libraries; complete sets of the initial 33 plates can be seen at the Cambridge University Library, Bodleian Library, Oxford, the British

Library, London and the Royal Institution Library in London; five of the later six plates can be seen in another 33-plate copy in the Cambridge Library. Five sets are in private ownership.

Fig. 3. Plate 6 "Hedge Woundwort *Stachys sylvatica* L." from Bradbury (1854).

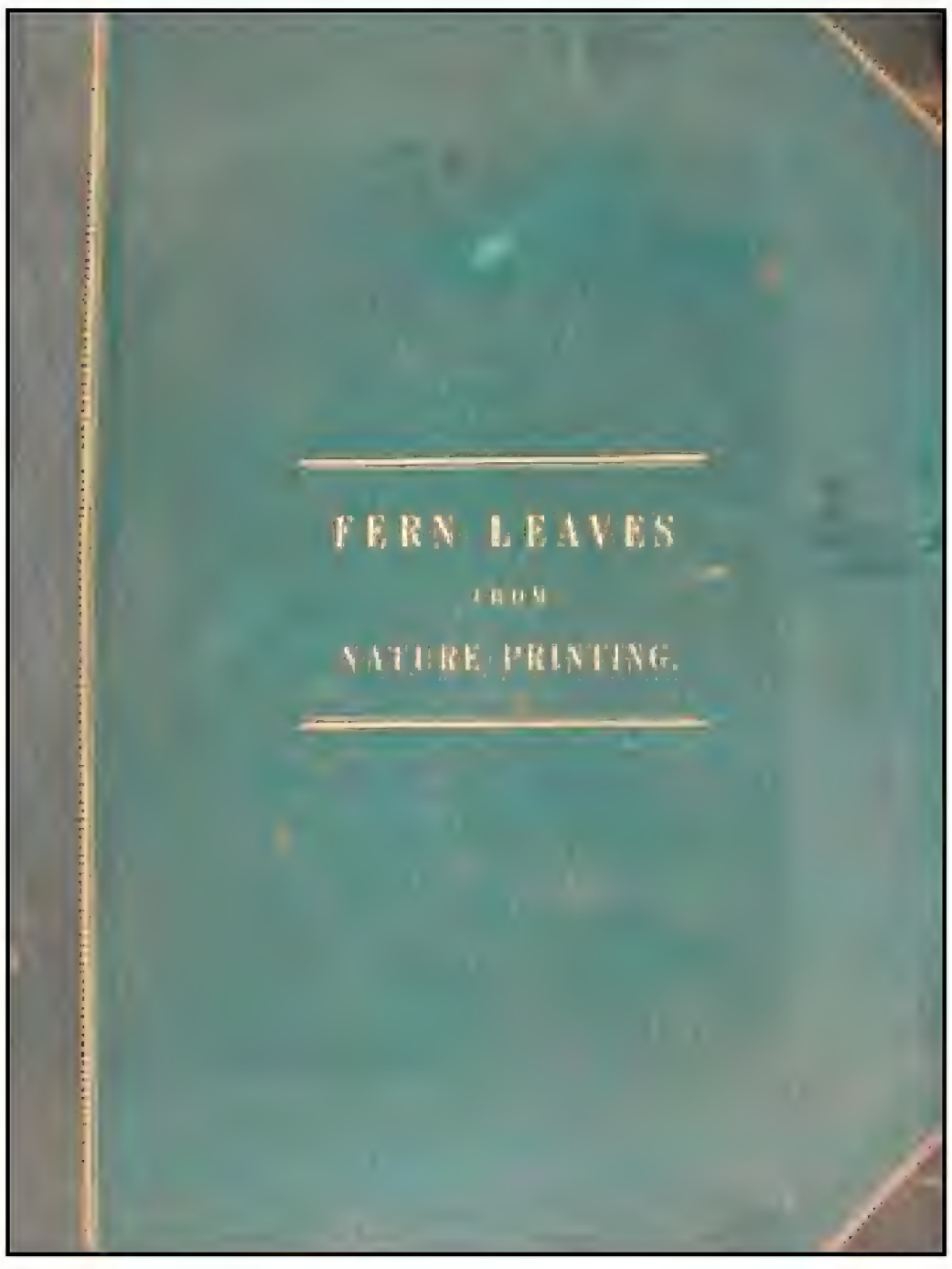


Fig. 4. A 21-plate set of Bradbury (1854) in contemporary binding. The wrong title "FERN LEAVES FROM NATURE PRINTING" on the front cover confirms that this set was not bound by Bradbury & Evans.

Since my 2015 article was published, Michael Hayward has drawn my attention to another, unbound, copy of this work that he found in Liverpool Museum Library. It consists of 20 plates (19 plates in a box, one mounted for display and kept separately), probably the survivors of a set of 21. It includes the following plates, numbered as in Bradbury's original list of plates (see the Table in Dyer (2004 and 2015)): plates No. 2, 3, 9-14, 19-24, 27, and 31-35. Two of the plates are of ferns (Figs. 5 and 6).

Fig. 5. Plate 20 Bree's Fern *Lastrea recurva* New. (= *Dryopteris aemula*) from Bradbury (1854). Photo by M. Hayward.

Fig. 6. Plate 32 Flowering Fern *Osmunda regalis* L. from Bradbury (1854). Photo by M. Hayward.

The Liverpool set also contains the later of the two alternative versions of the printed title page, which was issued with each set of prints, but does not include either of the printed sheets of "Nature-Printing Specimens. List of Plates" and "Opinions of the Press" that are found with some sets. The Liverpool set is of particular interest because it includes four sheets with printed plate numbers added to the Plate: No. 3 is labelled as "Nature Printing Plate 13"; No. 13 is labelled as " Nature Printing Plate 26" (Fig. 7); No. 22 as " Nature Printing Plate 23"; and No. 31 as "Nature Printing Plate 24". As reported in 2015, added plate numbers have also been found in 3 other sets: all the plates in two sets of 14, thought to have been issued later than the larger sets, and one set of 30 in which 5 plates have added plate numbers. None of the added plate numbers corresponds to the number given to the plate by Henry Bradbury in his original list. In total, 23 of the 39 plates issued are now known to have had numbers added on the plate at a later date; none of the other 16 plates has had numbers added in the 20 sets examined so far but it remains a possibility that all 39 plates were eventually re-numbered. The complete list can be found in Dyer (2015). It is not known when numbered plates first appeared or for what reason.

Fig. 7. Detail of a Nature-Print from a 14-print set of Bradbury (1854) showing the plate number "*Plate 26*" later added below "*Nature Printing*".

2. A comparison of the 1855/56 and 1857 issues of Moore's folio "The Ferns of Great Britain and Ireland".

According to the available information, about one quarter of the copies of the folio ferns are dated 1857 and represent a second issue. The first issue was initially sold in 17 unbound parts, or fascicles, from April 1855 to August 1856; the second issue was sold, perhaps as little as 5 months later, as a single complete volume. The date at the foot of the title page of the first issue is "MDCCCLV" even though some fascicles were not produced until 1856; the title page of the 1857 issue is identical except that the date is shown as "MDCCCLVII" (Fig. 8).

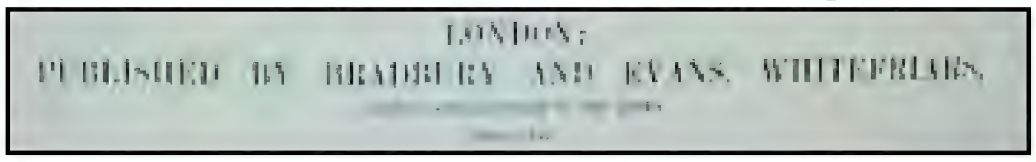


Fig. 8. Detail of the title page of Moore (1857) showing the date "MDCCCLVII".

Most surviving copies of the 1855/56 issue are in contemporary binding but the bindings differ and so does the insertion of the Nature-Prints: in some copies they are on the left side when the book is open (i.e. Plates bound along their right-hand margin), in other copies some or all are on the right side, and in at least one case, all the plates are at the end of the book. A few copies have been bound more recently, either for the first time or re-bound after the gutta-percha in the original binding has perished. It is likely that most of those who purchased the separate fascicles then arranged individually to have them bound into a volume once all the fascicles were available. A few copies of Moore (1855/56) were almost certainly bound by Bradbury & Evans, particularly those that have the Royal Coat of Arms of the United Kingdom on the front cover (Fig. 9; see also Fig. 17).

Fig. 9. This copy of Moore (1855/56) was bequeathed to the BPS by the late Graham Ackers and sold by auction. The Royal Coat of Arms of the United Kingdom on the front cover might be an indication that this volume was bound by Bradbury & Evans.

The Arms also appear on the front cover of Bradbury (1860) produced by Bradbury & Evans for private circulation, and on the later of two title pages of Bradbury (1854) on which the firm claims to be "BY ROYAL LETTERS PATENT". In Moore (1855/56), the publishers state on the title page that they are "PRINTERS EXTRAORDINARY TO THE QUEEN". Those copies of Moore (1855/56) that were bound by Bradbury & Evans might have been presentation copies or perhaps some of the purchasers arranged to have their copies bound by the publishers.

There are indications that there is less variation among the plates within the 1857 issue. In the 1855/56 issue, four plates (II, III, VI, and VIII) occur in two alternative versions with images of different fronds (Fig. 10).

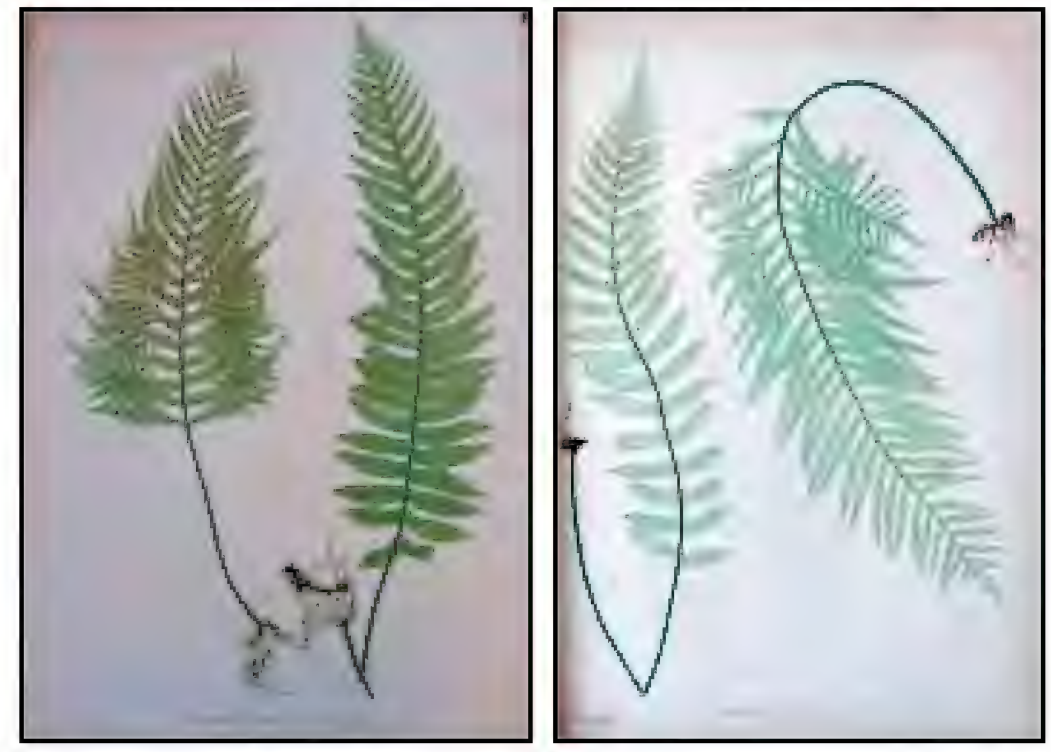


Fig. 10. Alternative versions of Plate II; the varieties portrayed are unchanged.
Left. The first version.
Right. The later version found in some copies of Moore (1855/56) and all examined copies of Moore (1857). Photos by M. Hayward.

For some reason the whole Nature-Printing process had to be repeated using new specimens during the printing of these four plates, all in the first three fascicles published. There are no obvious faults with the images in the first version that would seem to necessitate rejection by Bradbury in favour of a substitute. One copy (British Library catalogue no. 1259.d.30) has both versions of Plate II, which might suggest that both versions were simultaneously available, but it is in a modern binding complete with fascicle covers and contains no Plate III and two copies of Plate IV, so other interpretations are possible. Perhaps both the initial lead imprint and the relief copy of each of the first versions of these four plates were lost or damaged early in the printing process; the folio-sized metal plates must have been difficult to handle. In the 1857 issue, all 5 copies for which I have information have the same, unique, combination of these alternatives, whereas the 1855/56 issue includes at least 6 different combinations (Dyer, 2015). Both versions were available during April, May and June 1855, when the first three fascicles were issued, but by the time the complete volumes were assembled in 1857, only one version, which I have assumed to be the later replacement for a plate which failed early in the print run, was being used for each plate. It may be significant that most of the letters Bradbury received from Heads of States to thank him for complimentary copies of a complete volume are dated 1857 and 1858. It is tempting to conclude that Bradbury & Evans sold the 1855/56 issue only as unbound parts over a period of 17 months, and the 1857 issue only as the complete work in a bound volume which included only the later versions of Plates II, III, VI, and VIII.

After making the first detailed comparison of the two issues based largely on his own copies, Martin Rickard has discovered other, more subtle, differences (Rickard, 2016 pers.com.). In addition to those variations in the intensity of the inking that can also be observed within a copy, these differences include:

In Plate XIII, the caption is in green instead of black in his 1857 version.

In Plate XXVIII and XXXIII, sori have been touched up to increase their size.

In Plate XXXV, the label "B1" and associated lines are re-positioned in his 1857 version (Fig. 11). This is also true of the Missouri Botanic Gardens copy of the 1857 issue, available to view on line.

In Plate XXXVIII, the label "D" is missing from his 1857 version and the Missouri copy.

Fig. 11. Detail of Plate XXXV, showing the re-positioning of labels and lines: 11a. from Moore (1855/56). 11b. from Moore (1857). Photos by M. Rickard.

There are other instances of less conspicuous re-positioning, sometimes as little as 2mm, in Plates I, XVI, XVII, XXVI, XXXIV, XXXVIII, XXXIX, and XLV. Curiously, different labels on the same plate are not always displaced in the same way. The obvious implication of these observed re-positionings is that the labels were not engraved onto the copper intaglio plates of the fern impressions but each label was printed from separate plates.

Martin Rickard also observed that the Plate Numbers of 6 plates had an asterisk in his 1855/56 issue but not in his 1857 copy, although overall the 1857 issue had more asterisked plates (22) than the earlier issue (18). These Plate No. asterisks are discussed in Dyer (2015) without coming to a firm conclusion about their significance. I have surveyed 13 copies, including both issues. Of the 55 different plates (i.e. 51, plus four alternative versions 'b' of Plates II, III, VI and VIII with different images – see above), 45 have either no asterisk or one asterisk (Fig. 12 a,b); seven (i.e. Plates I, II versions a and b, III version b, VI version a, VIII versions a and b) include no examples with any asterisks; one (Plate VI version b) has one asterisk in all eight cases recorded; one (Plate XL) has either no asterisk or one asterisk or, in two cases, two asterisks; and one (Plate III version b) has either no asterisk or, in two cases, four asterisks.

Fig. 12a and b. Examples of asterisks with plate numbers.
12a.(left) Detail of Plate XXXVIII with one asterisk after the plate number.
12b.(right) Detail of Plate XXXIX with one asterisk after the plate number.

All seven Plates that have no asterisks in any of the examples examined occur in the first three fascicles of the 1855 issue, the same fascicles that included the four alternative plates. Until more copies are examined, perhaps revealing that all plates have examples with asterisks, it is not possible to know whether to read any significance into this overlap. The most plausible suggestion about the significance of the asterisks is that they indicate that the first intaglio plate has been replaced by another taken from the same relief copper 'master', perhaps because of damage caused by corrosive inks or problems of handling large plates. Perhaps one asterisk added to the Plate No. denotes a second relief plate, two asterisks a third, and so on. This would imply that at least 5 intaglio copies were made of Plate III, one of the first to be published, in April 1855.

3. Re-use of images of Nature-Printed ferns.

In Dyer (2015), I reported that images used in the folio plates of Moore (1855/56) were re-used in the octavo edition (Moore, 1859/60). Ten instances involving five folio plates, six octavo plates, and seven species have been identified (Table 1).

Folio ferns 1855/56 Plate numbers	Folio ferns 1859/60 Plate numbers	
XXXV111 G	LXX111 bis A	*Asplenium marimum*
XXXV111 H	LXX111 bis B	*Asplenium marinum*
XXX1X F	LXXV1 bis C (lower third deleted)	*Asplenium trichomanes*
XXX1X H	LXXV1 bis D	*Asplenium trichomanes*
XL1 A5 third from left	LXX1X D	*Asplenium ruta-muraria*
XL1 A7	LXX1X B bottom left	*Asplenium ruta-muraria*
XL1 A8	LXX1X C (lower half of stipe deleted)	*Asplenium ruta-muraria*
XL1 B2	LXXX A top left of four	*'Asplenium germanicum'**
XL111 A4	XC111 B left of two (part of stipe deleted)	*'Ceterach officinarum'***
L1 B3 right of two	CX111 B bottom right of three	*Ophioglossum vulgatum*

* Now *Asplenium* x *alternifolium*
** Now *Asplenium ceterach*

Table 1: The re-use of images in Moore (1855/56)

Examples are shown in Fig. 13 below.

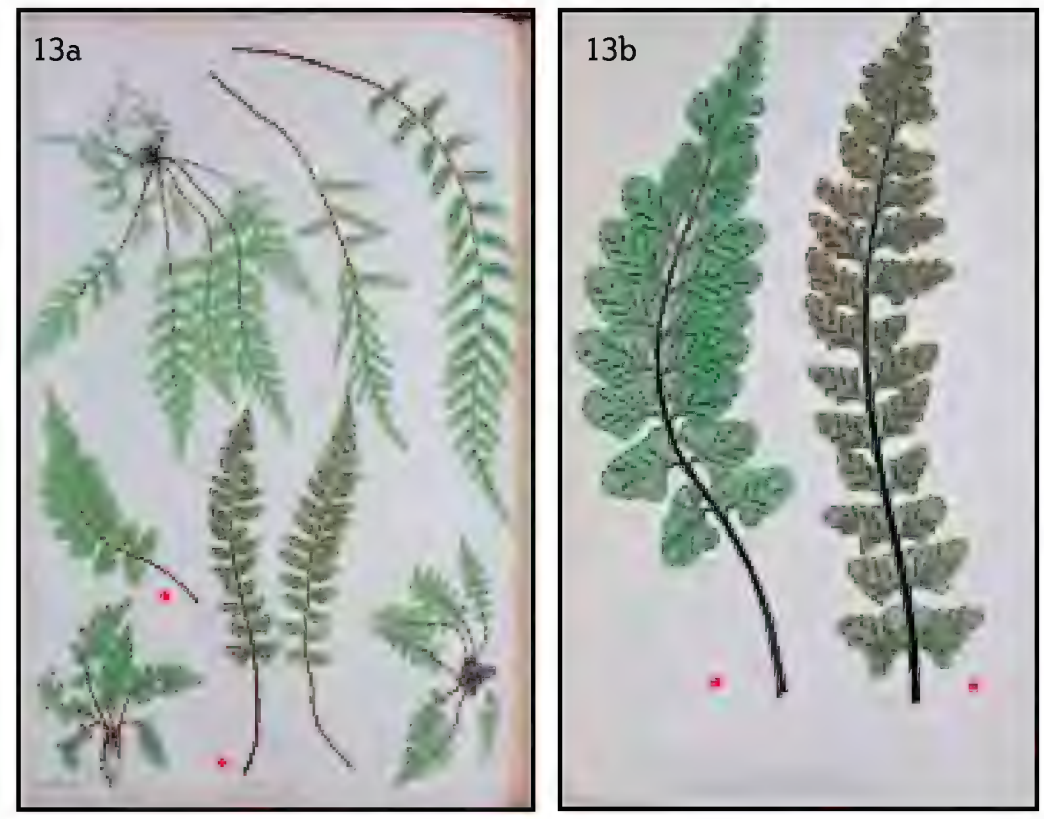


Fig. 13. Examples of the reuse of images from Moore (1855/56) in Moore (1859/60); red spots indicate the images affected: 13a. Moore (1855/56) Plate XXXVIII G and H (*Asplenium marinum*) re-used in 13b. Moore (1859/60)

Fig 13 continued. Plate LXXIIIbis A and B; 13c. Moore (1855/56) Plate XXXIX F and H (*Asplenium trichomanes*) re-used in 13d. Moore (1859/60) Plate LXXVI C and D; 13e. detail from Moore (1855/56) Plate XLI A5, A7 and A8 (*Asplenium ruta-muraria*), and B2 ('*Asplenium germanicum*') re-used in Moore (1855/56) 13f. Plate LXXIX D, B and C and 13g. Plate LXXX A.

In each case, the image of a single frond from a composite folio plate of two or more fronds has been incorporated alongside new images into a composite octavo plate. All the fronds are small, and all are of rare varieties or hybrids that would have been difficult to obtain. In two cases, the lower part of the stipe has been removed in order to fit it into the octavo plate.

Tim Preston (aka Simon Prett, pers. com. 2015) and Pia Östlund (pers. com. 2015) agreed that it was likely that a single folio impression comprising several images was made when all the material was simultaneously available, and, from this, a relief copper electroform was produced. From this, several identical copper intaglio plates can be formed. These could be used to speed up the printing of large editions. Individual images could be cut out of either the relief or the intaglio copper electroform stages, although in order to retain the relief plate intact for possible future use, an intaglio plate must be used. The excised images could then be incorporated into a suitably cut octavo plate which is then burnished to hide the join.

Östlund has told me that Auer used a similar process at the Staatsdruckerei in Vienna as shown in the two images she supplied (Fig. 14).

Fig. 14a and b. The Auer Nature-Print in 14a re-used in a composite print 14b. Photos by P. Östlund

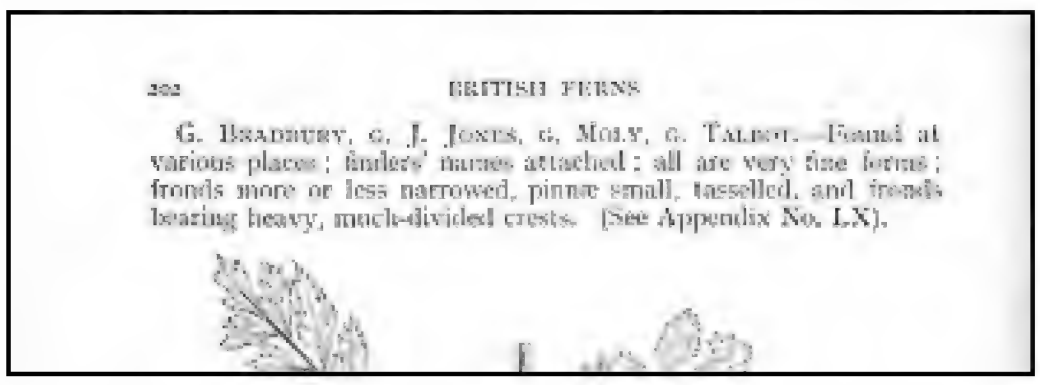
4. The last published 19th Century Nature-Prints by the Auer/Bradbury method.

In Dyer (2015) I stated that a new issue of Physiotypia Plantarum Austriacum by Ettinghausen and Pokorny, published in 1873, was the last publication illustrated by Nature-Prints produced by the method pioneered by Auer at the Staatsdruckerei in Vienna and adopted or further developed by Bradbury. Michael Hayward has informed me that there were Nature-Prints in an article published by the Staatsdruckerei, Vienna, in 1896: *Über neue Pflanzenfossilien in der Radoboj-Sammlung der Universität Lüttich* by C. F. Ettinghausen (Fig. 15)

Fig. 15. A plate from the last publication with Nature-Prints by the Auer/Bradbury method: Ettinghausen, C. F. (1896) *Über neue Pflanzenfossilien in der Radoboj-Sammlung der Universität Lüttich*. Photo by M. Hayward.

5. Bradbury's Soft Shield Fern?

Druery (Druery 1910, page 202) refers to a variety of "*Polystichum angulare*" (= *setiferum*) as "var. Grandiceps Bradbury" (Fig. 16). It is stated that Bradbury is the name of its finder but there is no information about the variety or the person in question. I can find no mention of the variety, nor the name Bradbury in association with naming, finding or growing this or any other fern species, in Moore (1855/56, 1859/60), Lowe (1874, 1895), Druery (1910), Anon (1991), Dyce (2005) or Hayward (2015). There is no evidence that Henry Bradbury himself collected specimens for his Nature-Prints; they were provided by Moore with contributions from others. In Moore (1855/56), 35 collectors, who may also have pressed the specimens, are named. However, is it possible that *Polystichum angulare* var. Grandiceps Bradbury was named after Henry, possibly after he died, even perhaps to commemorate the 50th anniversary of one of his publications or of his death in 1860? The absence of this variety from Dyce (2005) suggests that it no longer exists.


202 BRITISH FERNS

G. Bradbury, c. J. Jones, c, Moly, c. Talbot.—Found at various places; finders' names attached: all are very fine forms; fronds more or less narrowed, pinnæ small, tasselled, and fronds bearing heavy, much-divided crests. [See Appendix No. LX].

Fig. 16. Detail of page 202 in Druery (1910) showing the reference to '*Polystichum angulare* var. Grandiceps Bradbury' ("G." refers to the heading "GRANDICEPS", introduced on the previous page in a list of *Polystichum angulare* (= *P. setiferum*) varieties.

6. Buying Bradbury Nature-Prints of Ferns.

Bradbury's earliest publication, Bradbury (1854; see Note 1 above) was produced in small numbers. Most of the 20 known copies are in museums and libraries and this work is very rarely offered for sale. I have found no record of sales since 2015.

The folio "The Ferns of Great Britain and Ireland" by Moore, usually the first issue (1855/56), continues to be occasionally listed by booksellers. ABE Books currently offers two copies of the 1855/56 issue, both in the USA, at GBP-equivalent prices of about £3,700 and about £12,800. In 2016 on eBay, BIGCAM of Cheltenham offered a copy of the rarer 1857 issue, bound by Bradbury & Evans judging by the Royal Crest on the front cover, at a buy-it-now price of £4,750 (Fig.17).

Fig. 17

. Moore (1857) for sale on E-bay in 2016.

In December, 2015, Christies sold for £3,500 a particularly interesting copy (Sale 1214, Lot 261: see references for a link) containing a label stating that it was presented by Henry Bradbury in November 1856. Christies kindly provided me with information that confirmed that this copy was sold by the Royal Institution of London (RI) and is apparently the copy that Henry Bradbury presented to the Institution. The November 1856 date was 8 months after he was elected a member of the Royal Institution ("MRI"), 6 months after his first lecture (on Nature-Printing) to the RI, and 3 months after the last fascicle was first published (see Note 2 above). The label is not in Bradbury's handwriting, so perhaps it was written by the RI librarian. Regarding Plates II, III, VI and VIII, which were published in two versions (see Note 2 above), this RI copy has what has been interpreted as the first-produced versions of Plates III and VI but the second versions of Plates II and VIII. This is the most common of the six combinations of alternative versions I have found among the 10 copies of Moore (1855/56) that I have examined. Perhaps this combination was the one preferred by Bradbury and chosen by him for the copy he presented to the Royal Institution. It may be that this copy, which has an interesting history and was almost certainly handled by Henry Bradbury, was bought by a BPS member who will read this article.

The more common two-volume octavo "The Nature-Printed British Ferns", usually the first, 1859/60, issue, still regularly appears in booksellers' lists. ABE Books are currently advertising six copies offered by booksellers in the UK, Germany and the USA for prices from £380 to over £600, some in original binding and others re-bound. BAUMAN Rare Books lists a re-bound copy at $1200.

7. Bradbury folio fern plates as artistic inspiration

The Scottish artist, sculptor and film maker Lucy Skaer has produced installations in which images and historical objects are "recontextualized". In her "The Green Man" exhibition in the Talbot Rice Gallery, University of Edinburgh, from 26th July to 6th October 2018, she featured a print from Moore 1855/56 (as well as several of Bradbury's seaweed Nature-Prints) taken from the collection of the University of Edinburgh. In her publicity, Skaer wrote:

> The artist is showing and also reworking a selection of intimately detailed seaweed and ferns prints found in eminent printer Henry Bradbury's publications from the 1850s and 60s. She has combined Bradbury's nature prints with cutting edge microchip designs from the University's School of Informatics.

8. Newspaper accounts of Henry Bradbury's death

As stated in Dyer (2015), Charles Dickens revealed in correspondence that the Bradbury family used their "strong influence" to keep the facts of Henry's death out of the newspapers, and I had by then traced only the brief notice on page 1 of *The Times* for 5th September 1860. However, Tim Preston (aka Simon Prett, pers. com. 2016) has informed me of the following published notices:

In *The Morning Post* (London, England) Thursday, 6th September, 1860, page 8, Issue 27058, under 'Births, Deaths, Marriages and Obituaries'; and in *The Era* (London, England) Sunday September 9th, 1860, Issue 1146, under 'Advertisements and Notices' (same wording in both):

> 'Bradbury – On the 1st inst., suddenly, aged thirty-one, Henry, eldest son of William Bradbury of Whitefriars.'

The wording, with no mention of suicide, was similar to that in The Times notice, and was probably supplied

by William Bradbury. As in the Times notice and on the grave headstone (see Note 10 below), his age is given incorrectly. Henry was 19 days short of his 31st birthday when he died. Subsequently, *The Belfast Newsletter* published the following more detailed accounts in their 'London Correspondence', which were clearly not supplied by the family:

> The Belfast Newsletter, Belfast, Northern Ireland, Wednesday, September 12, 1860:
>
> The late Mr. William [sic] Bradbury, a junior partner in the firm of Bradbury, Evans & Co., the eminent printers and publishers, of Fleet Street, whose death, "suddenly," appeared in the London journals on Saturday, committed suicide under very distressing circumstances. In consequence of the feud between Mr. C. Dickens and the senior partners in the firm, a matrimonial engagement, was, it is said, broken off between the late Mr. Bradbury and a daughter of Mr. Dickens, which preyed so much upon the mind of the unfortunate gentleman that he put an end to his existence. It is also stated that he had, unknown to his family, contracted some pecuniary obligations, which added materially to aggravate his position. Mr. William Bradbury was extremely well-looking, his prospects were good, and he was about the last person in the world who would be suspected of terminating his existence by a violent death.

This gossipy account referred to William Bradbury instead of Henry. Two days later, the paper corrected that error, though wrongly referred to Henry Bradbury as the author of Moore (1855/56) and the process used for the illustrations as "chromolithography".

> The Belfast Newsletter (Belfast, Northern Ireland), Friday, September 14, 1860:
>
> The suicide mania seems to have set in earlier than usual this Autumn. The first faint touch of frost has brought a crop of horrors in that way almost unprecedented. The Mr. Bradbury who made away with himself the other day was Mr. Henry (not William) Bradbury, the author of the beautiful publication called "Nature-Printed Ferns", one of the most costly and magnificent specimens of typography and cromo lithography ever produced in this country. He swallowed prussic acid at Cremorne Gardens.

Chadwick (2016) refers to an account in the West Middlesex Advertiser and Family Journal for 8th September 1860 that provides further details of the circumstances of Henry's death. A cryptic report in the Exeter Flying Post of 12th September 1860 refers to his "attempted suicide" with "extravagance and debt" as the causes.

9. Henry Bradbury's matrimonial disappointment.

In Dyer (2015), I referred to the report in Patten (2004) of a statement by George Holsworth, an employee of a journal being printed by Bradbury & Evans, that in 1860 Henry Bradbury was depressed because a daughter of Frederick Mullet Evans, business partner of Henry's father William, was marrying someone else, the implication being that this, at least in part, contributed to his decision to commit suicide. I concluded that of Evans's four adult daughters, it was likely that the daughter in question was Margaret Moule Evans, who married Robert Orridge on 21 August 1860, just 11 days before Henry died. Chadwick (2016) came to the same conclusion after referring to a letter from Charles Dickens to journalist William Henry Wills in which Dickens wrote that George Holsworth, a staff member on Dickens's *All the Year Round*, had said that Henry Bradbury's suicide had been because of his unrequited love for a recently married daughter of Frederick Mullett Evans. However, Prett and Östlund (2016, page 157) subsequently drew attention to a different story that was published in an announcement of Henry's death in *The Belfast News-Letter* on September 12, 1860 (see Note 8 above). This stated that Henry's suicidal depression occurred when his engagement to one of Charles Dickens's daughters, unnamed, was broken off. The Bradbury, Evans and Dickens children would have known each other well in the 1840s and 1850s, during which time the three families met socially on many occasions, although, after 1858, Dickens was in acrimonious dispute with both Evans and Bradbury and had ceased any contact with their families. Prett & Östlund add that it is known that Dickens's oldest daughter Mary Angela ("Mamie") Dickens (1838-1896) did have a proposal of marriage rejected by her father on the grounds that he deemed the match unsuitable. The date of the proposal and the name of the suitor are unknown - a critical set of Dickens's letters is missing from the British Library (Tim Preston, pers.com 2016). Mamie was severely depressed after the rejection and never married. A memorial to Mamie is next to her mother's grave, not far from Henry Bradbury's grave in Highgate West Cemetery (see Note 10 below). The circumstantial evidence does suggest that Mamie might have been the object of Henry Bradbury's affections, but as Holsworth commented that the girl concerned had already married someone else when Henry committed suicide, it is worth noting also that Mamie's younger sister Catherine Elizabeth Macready ("Kate") Dickens (1839-1929) married author Wilkie Collins' brother Charles Allstone Collins on 17th July 1860, just 46 days before Henry died.

10. The Bradbury family tree.

Henry Bradbury's father William and mother Sarah (née Price) were born in Bakewell, Derbyshire. Bradbury was a common name in 18th and 19th Century Bakewell, and most, if not all, of those who had that name were related to William. In a brochure produced in the mid-1980s by Bradbury, Wilkinson & Co. it was stated that William and Henry's antecedents were stone masons. Although a few Bakewell Bradburys in the early 1800s were stone or marble masons, many of the male Bradburys related to William for whom occupations are known were, like many other men in Bakewell at the time, leather workers: shoe makers or cordwainers. I have researched Henry's family tree further since 2015 and his direct ancestors and their siblings, back to John Bradbury who died in 1724, are shown in the footnotes.

Until 1827, all the featured Bradburys were born and baptized in Bakewell and most of them later also married and were buried there (Figs. 18, 19).

Fig. 18.(left) Headstone of the grave of Henry Bradbury's great-grandfather Ralph Bradbury (1754-1833) and his wife Hannah Redfearn (ca.1758-1833). All Saints' Church, Bakewell, Derbyshire. (Hannah's age at death as given on the stone may be wrong; the parish records are inconsistent and the only likely recorded baptism is for a Hannah Redfern who was baptised at the church on 12th November 1758, so she may have been no more than 74 when she died, and 16 when she married.)

Photo Y. Golding

Fig. 19.(left) Memorial stone of Henry Bradbury's great-great-great-grandfather John Bradbury (?-1724) and his wife Margarett, here abbreviated to 'Marget'(ca.1686-1740). All Saints' Church, Bakewell, Derbyshire.

Photo Y. Golding.

William and Sarah were buried in the same grave as Henry in Highgate West Cemetery (Fig. 20).

Fig. 20. Memorial at the grave of William, Sarah and Henry Bradbury in Highgate West Cemetery, London. Weathering has partially obscured the inscriptions to Henry (facing surface) and to William and Sarah (right-hand surface); both are just readable at the site but difficult to photograph.

The three inscriptions read:

IN MEMORY OF
WILLIAM BRADBURY
OF WHITEFRIARS
DIED THE 11 APRIL 1869
IN HIS 70TH YEAR

ALSO OF SARAH BRADBURY
WIDOW OF THE ABOVE
DIED THE 25TH DECEMBER 1898
IN HER 96TH YEAR.

ALSO OF
HENRY RILEY BRADBURY
DIED SEPTEMBER 1 1860
AGED 31 YEARS

The implication is that the stone was erected after William was buried in 1869 in the same grave as Henry, who had been buried in 1860 in consecrated ground despite having committed suicide (at the age of 30, not 31).

William's sister Mary (1803-1868) married William Dent, who was an early partner of William Bradbury, first in Lincoln and then London. They formed the printing firms Bradbury & Dent (1824-1828) and Bradbury, Dent & Manning (1828-1829) in Fleet Street before Bradbury & Evans was formed in 1830. Henry Bradbury's brother William Hardwick Bradbury and Frederick Moule Evans took charge of Bradbury & Evans after William Bradbury and Frederick Mullett Evans retired in 1865. In 1860, William Hardwick Bradbury had married Laura Agnew, daughter of Thomas Agnew, art dealer of Manchester, and in 1864, William Hardwick's sister Edith married Laura's brother Charles Swain Agnew. Two other Agnew brothers, Thomas and William, became partners in Bradbury & Evans in 1872 when Frederick Moule Evans withdrew from the partnership. The company was re-financed with Agnew money and became Bradbury, Evans & Co. with William Hardwick Bradbury as chairman. When William Hardwick Bradbury died in 1892, his son William Lawrence Bradbury became joint managing director with William Agnew and the firm was re-named Bradbury, Agnew & Co. They owned the magazine Punch, which Bradbury & Evans had bought in 1842, until 1969.

More information, especially about the Bradbury family, the early life and printing apprenticeship of William Bradbury in Lincoln, the Price family and the Dent family, can be found online (Chadwick, 2016).

11. The family of William Bradbury's business partner Frederick Mullett Evans.

In my article (Dyer 2015), the list with dates of the children of Frederick Mullett Evans (Note 23, page 197) which I had taken from the Oxford Dictionary of National Biography was incomplete. Jane Chadwick, William Bradbury's 4 times great-grand-daughter, has kindly provided me with the full list (Chadwick pers.com. 2020), taken from "*Family chronicle of the descendants of T. Evans, of Brecon, from 1678-1851.*", published in Bristol 1870-71. The full list is:

Sarah Moule Evans (1831-1832); Frederick Moule Evans (1832-1902); Thomas Mullett Evans (1834-1872); George Moule Evans (1836-1891); Margaret Moule Evans (1837-1909); Joseph Jeffries Evans (1839-1840); Elizabeth Matilda Moule Evans (1840-1907); Horace Moule Evans (1841-1923); Mary Josephine Jedidiah Evans (1843-1845); Frances Joan Moule Evans (1845-1846); Lewis Moule Evans (1846-1878) and Gertrude Moule Evans (1847-1919). Their mother, Maria, née Moule, died in about 1850, no doubt of exhaustion!

The Godfrey Flyn Evans mentioned in Dyer (2015, Note 23) was not Frederick Mullett Evans's son, but his nephew, son of Robert Mullett Evans and his wife Matilda.

Footnote:

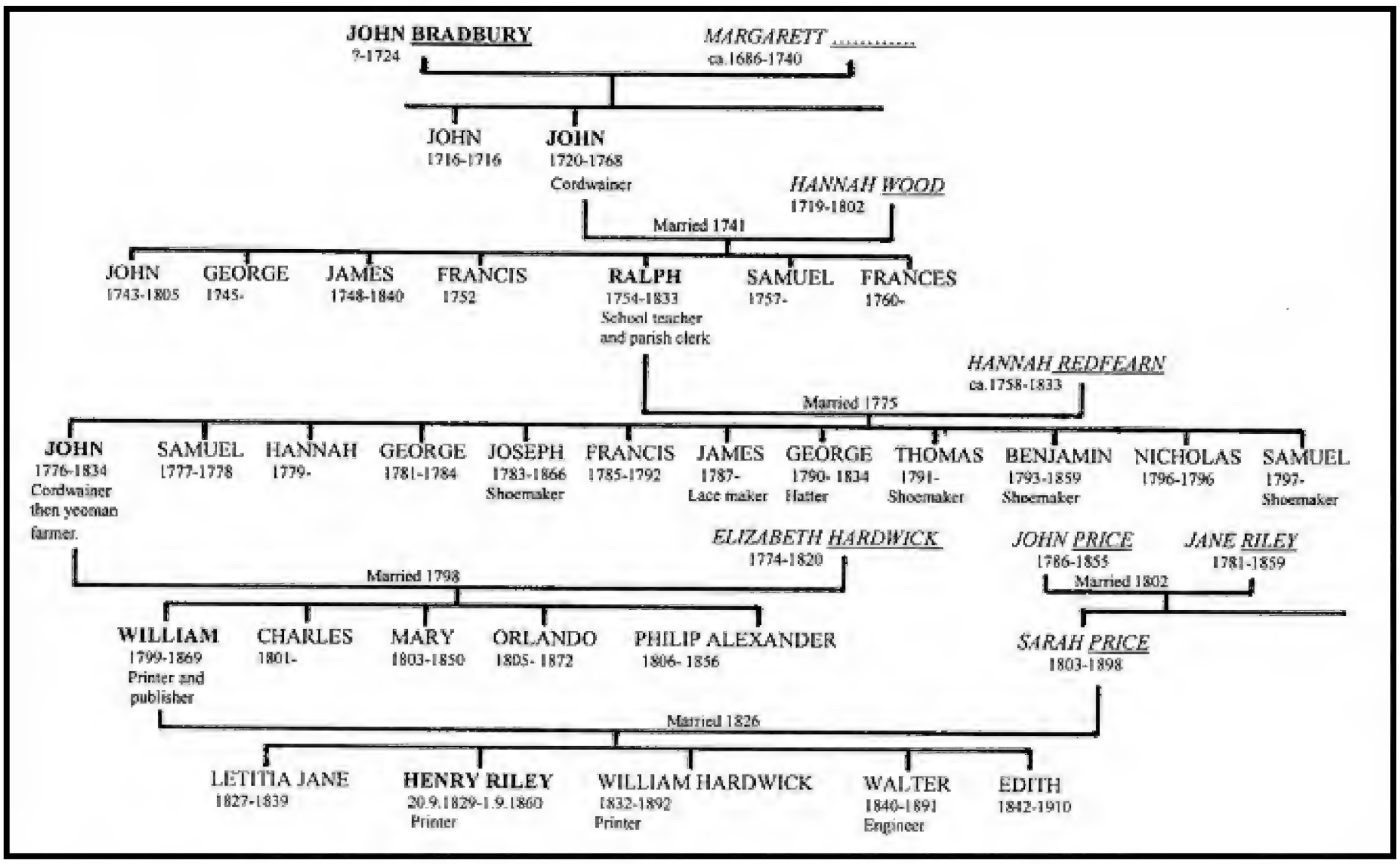
Corrections to errors in Dyer (2015).

Page 132; right-hand column, line -7: for "218" read "220"

Page 160; right-hand column, lines -15,-16: Delete "but with no superscript".

Page 164; right-hand column, line 3: for "222" read "224".

Page 179; left-hand column, last line: for "218" read "220".



The family tree of Henry Bradbury. Direct paternal ancestors are shown in bold. Surnames are underlined. The names of relatives with surnames other than Bradbury are shown in italics; all others have the surname Bradbury. The families of siblings of Henry's ancestors have been omitted for simplicity.

Page 181; right-hand column, line 23: for "218" read "220".

Page 181 ; right-hand column, line 27: for "9" read "10".

Page 181 ; right-hand column: Insert the three plate numbers indicated in bold into lines 28 and 29 which will then read: "... XXII½; XLII^{A} and XLII^{B}; LIX^{A}, LIX^{B}, **and LIX^{C}**; LXVIII^{A} and LXVIII^{B}; **LXIX^{A} and LXIX^{B}**; LXX^{A}, LXX^{B} and ..."

Page 185; right-hand column, line 6: for "LXIII" read "LXXIII".

Page 196; right-hand column, Note 18, line 10: for "1868" read "1850".

Page 211; right-hand column, line 7: for "94" read "95".

(Note for clarification: Apparent inconsistencies between the total numbers of Nature-Prints quoted for both octavo publications (seaweeds: "220" and "224"; ferns: "122" and "124") result from the inclusion, or not, of the small vignettes on the decorative title pages.

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Asplenium rhizophyllum x *tutwilerae*, a Newly Made Old Hybrid

Rolf Thiemann

Fig. 1. *Asplenium rhizophyllum* x *tutwilerae*, March 2015

Fig. 2. *Asplenium rhizophyllum* x *tutwilerae* in September 2016, still indoors

Fig. 3. Hybrid September 2016, close-up

This article has been reprinted from last years edition and contains the corrections requested by the author.

A.E.G.

Asplenium rhizophyllum *Asplenium rhizophyllum* L. (Syn.: *Camptosorus rhizophyllus* (L.) Link), the Walking Fern, grows in eastern part of North America and is a parental species of a group of Asplenium species and hybrids in the Appalachian region. One cross occurs with *A. platyneuron* (L.) Britton, Sterns & Poggenb., the Ebony Spleenwort. This hybrid is found at several places where both species grow together. It is normally sterile but at one locality a plant was found which was fully fertile. For a long time it was controversal whether it was a hybrid or a new species, and it was cited as *A. ebenoides* or *A. x ebenoides*, the Scott's Spleenwort or Dragon Tail Fern. The fertile plant was discovered by Julia Tutwiler (1841-1916) (an honoured person in the public life of Alabama, active in education and prison reform, and as a poet) in 1873 at Havana Glen in Hale County, Alabama. By reason of the fertility it is in the trade and widespread in American and European fern gardens under the name *A. ebenoides*. In 2007 it was separated from the sterile hybrid plants as a new species and named after Tutwiler as *Asplenium tutwilerae* by Keener & Davenport. This is now the correct name for all fertile plants we have in culture.

As fertile species, *A. tutwilerae* is able to backcross with its parents. Both backcrosses are known. The cross with *A. platyneuron* is *A. x boydstoniae*. The backcross of *A. tutwilerae* with *A. rhizophyllum* has been found once in nature (Shepherdstown, Jefferson County, West Virginia, on moss-covered limestone cliffs). At this

Fig. 4. *Asplenium rhizophyllum* x *tutwilerae* in November 2017 after its first summer outdoors in the rock garden

Fig. 5. *Asplenium rhizophyllum* x *tutwilerae*, close-up

Fig. 6. Full adult *Asplenium rhizophyllum* x *tutwilerae* in September 2018, the fronds are now very irregular. Some frond tips are still rolling out.

Fig.7. *Asplenium rhizophyllum* x *tutwilerae* in November 2018

locality no *A. tutwilerae* was found; the formation of this hybrid plant is therefore mysterious. A second plant arose accidentally in a culture of *A. rhizophyllum* at Fernwood, Niles, Michigan, grown by K.E. Boydston. So far as I know this hybrid has not yet been named. I could not find out whether it exists still in science collection cultures. It is presumably not in the trade or in private gardens.

Fig. 8. Development of *Asplenium tutwilerae*, the largest frond has a length of 16.5 cm

Some years ago I decided to create this hybrid artificially. I sowed of the spores of *A. rhizophyllum* on Feb. 25th 2012; the *A. tutwilerae* spores were also sown in 2012. On Feb. 25th 2013 the prothallii of both species where pricked out in pairs together. Two hybrid plants arose. Both had *A. rhizophyllum* as mother and *A. tutwilerae* as father. I managed the trial in order that the chance of this combination was more probable because it was unknown to me what causes the property of building bulbils – is it the DNA or the protoplasm or both?; therefore I thought it would be better to have *A. rhizophyllum* as mother. The young plants resemble *A. rhizophyllum* more than *A. tutwilerae*. They produce very early bulbils on small fronds. Fronds of adult plants are mostly lobed only in the lower part (see Fig. 12), as shown too in Wagner's and Boyston's article, but sometimes some extra large fronds resemble those of *A. tutwilerae* and are extremely irregular (see Fig. 11). Frond length can be 25cm or more.

Fig. 9. Development of the hybrid

Fig. 10. Extraordinary large frond (28 cm) of *Asplenium tutwilerae*

Fig. 11. *Asplenium rhizophyllum* x *tutwilerae.* Extra large frond, length 33cm. The tip of the frond is still not fully rolled out

Large fronds of the hybrid show a phenomenon which can be seen in other hybrids in which *A. rhizophyllum* is involved: extremely long basal segments (see Fig. 11). Hybrids of *Asplenium. scolope*ndrium sometimes show this attribute as well (see Pteridologist 2014, page 42-43).

In the past I have created some other hybrids with *A. rhizophyllum* (see Pteridologist 2014, p. 42 ff). These hybrids (*A. rhizophyllum x obovatum; A. rhizophyllum x billotii*) show the same difficulties in culture as *A. rhizophyllum* itself: they are attractive food for snails and slugs and also some insects, like grasshoppers, love them. This is a great problem, also with *A. tutwilerae* and other Aspleniums which have *A. rhizophyllum* or *A. ruprechtii*, the Asian Walking Fern, as one parent. The problem is exacerbated by the fact that these plants are also slow growing and awake late in spring. Surprisingly the hybrid *A. rhizophyllum x tutwilerae* will grow more quickly and suffered only minor damage from feeding. Perhaps the very dry summer of 2018 had sheltered the plants from hungry marauders. I cultivate the plants in neutral soil in light shade with little sun in late afternoon. The hybrid should be hardy in zone 4 or 5. It seems that the plants produce bulbils only when young and later is few chance to get the hybrid vegetatively propagated. Is it the reason that the old hybrid plants probably are lost? Therefore all chances must be used for bulbil propagation because the hybrid is sterile!

Fig. 12. *Asplenium rhizophyluum* x *tutwilerae*, average frond form and size of adult plant, length of the longest frond is 23cm, with bulbils removed

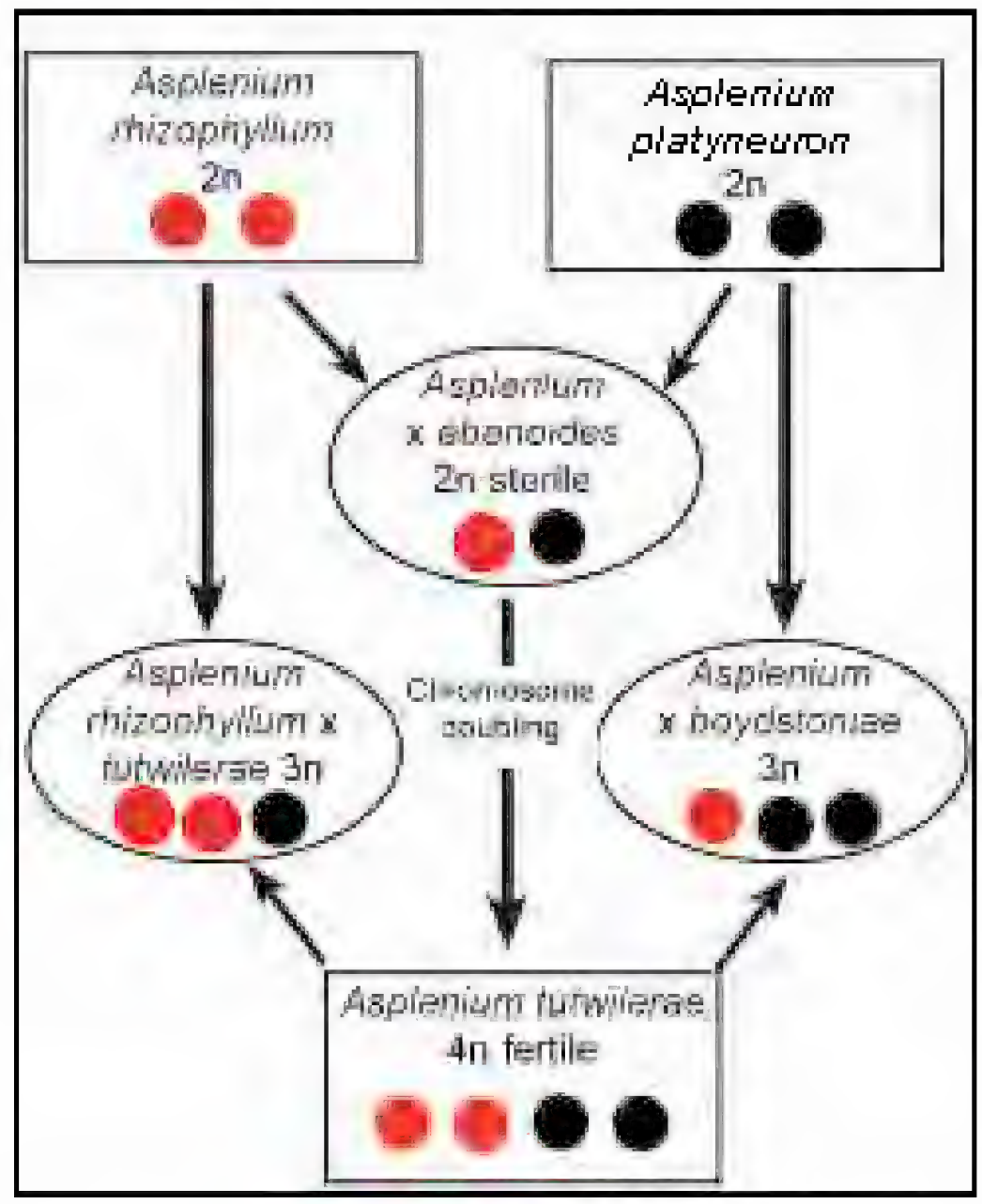

Fig. 13. The *Asplenium rhizophyllum - platyneuron* complex. The triploid backcrosses are all sterile.

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Wikipedia: Keywords Asplenium tutwilerae, Asplenium x ebenoides; also more literature specifications there

Xerophytic ferns

Albin Duzer

This article first appeared in the French magazine *Plantaexotica,* last year. It has been translated by a member of the B.P.S. and reproduced here with permission. The author lives in Provence, a region in southeastern France bordering Italy and the Mediterranean Sea A.E.G.

I've been an inveterate fern collector since a wonderful initiation trip to New Zealand. I left my beautiful Touraine a few years ago to go to live in Provence; I instantly felt good in this magical place, and was amazed by the local flora, much richer and more diverse than in my native region. My beloved ferns were not at all of the same opinion, and would have signed for an immediate return ticket! The length of summer, the very high temperatures, the intense drought and, especially, the violent wind called "mistral", which can blow here for days and nights without interruption, were factors completely contrary to the basic needs of my ferns.

No matter how hard I tried to find the most protected places, the problem lay in the fact that my collection was mainly made up of "classic" ferns, such as *Polystichum, Dryopteris, Athyrium, Blechnum, Matteuccia, Arachniodes, Gymnocarpium, Woodwardia*; species that have needs mainly of shade, humidity, and little air movement. The classic image that we have of a fern is associated with cool and humid places, valleys where a river flows, waterfalls, undergrowth with mushroom smells; the opposite of the garrigue! However, I noticed that, despite these hostile conditions to Pteridophytes, one could admire here and there *Asplenium ceterach* (Fig. 1). There were therefore species perfectly adapted to this Mediterranean climate, so dry and so windy; xerophytic ferns (or xeric, that is to say adapted to drought, to aridity) that had found strategies to get around these problems, and curiosity led me to look for them.

Fig. 1. *Asplenium ceterach*, the rustyback fern

I discovered that there was indeed a variety of these xerophytic species in all places of the world with Mediterranean or semi-desert climate; in particular in the family of Pteridaceae. Thanks to the fern nursery specialist Olivier Ezavin, I obtained ten species to start my tests. I armed myself with patience and books, repatriated the survivors of the initial collection in Touraine, and the Pterido-Provençal adventure could finally begin!

In nature

These ferns are found on all continents, always in regions with a marked dry season, in particular in South Africa, Australia and all around the Mediterranean; the American continent being without question the place where we have described the most species, with Mexico and the southern United States (California, Arizona, Texas) as the focus [Mickel and Smith 2004]. In all these places there hide, most often in rock crevices, at the base of scree or large blocks of stone, in canyons or under bushes, species belonging to the genera *Pellaea, Cheilanthes, Aleuritopteris, Cosentinia, Notholaena, Myriopteris* (Fig. 2), *Argyrochosma*, or even *Astrolepis*; to name a few. Many of these species have fragmented distribution areas, often with hundreds of kilometres between stations. Most are restricted to a precise geological environment; some

Fig. 2. *Myriopteris alabamensis*

growing only on limestone rocks, others on siliceous, granitic or volcanic rocks, which does not make their culture easy but allows you to deepen your knowledge in geology - which is never a bad thing when you are interested in plants.

Generally exposed to the south, but often under a mineral parasol, they are equipped to survive dryness and heat at the level of the aerial parts; it should not be forgotten, however, that their roots are well wedged under the rocks or in crevices, in stable freshness and humidity, a factor to be taken into account for successful cultivation.

All the genera mentioned above belong to the family of Pteridaceae ; certainly not the only family of ferns to have developed adaptations to drought (our *Asplenium ceterach* is part of the Aspleniaceae for example), but which is the most represented, the most diversified in this field, and, in my opinion, the most exciting.

Taxonomic movements in Pteridaceae

Many taxonomic changes have recently taken place within this family, particularly in the *Cheilanthes* group (Cheilanthoids in English), a group to which a large number of xerophytic species belong. The extreme conditions to which these ferns are subjected have selected similar morphological characters in species of different kinship; this evolutionary convergence has caused confusion among botanists. Certain species have thus passed through several genera, and it is often difficult to find them in the literature, the names changing according to the times and the authors. Our European *Cheilanthes* species, for example, recently became *Allosorus* [Prelli 2015], but are already in the process of being possibly renamed *Oeosporangium* (Fig. 3) [Global Biodiversity Information Facility], while most of the Central American species have been transferred to the genus *Myriopteris*[Grusz and Windham 2013]. Molecular phylogeny sorts out polyphyletic genera, composed of morphologically similar species but from different ancestors; monophyletic genera are comprise species from the same common ancestor.

Fig. 3. *Oeosporangium chusanum*

Adaptations

Desiccation and revival

During periods of summer drought when water is completely lacking, many species will allow their fronds to dry completely, reducing their activity to a minimum and returning to dormancy. Their leaf tissue can lose up to 90% of water without dying; from the first autumn rains they will be able to fill up with water almost immediately: it's revival! The capacity to re-green after drying differs according to the species, some being able to do it only at the end of a short period, others pushing the endurance up to several years. One can also sometimes observe fronds which only half become green again ,*Astrolepis sinuata* (Fig. 4) for example. Some have a coating consisting of a protective barrier made of dead cells that, in contact with water, acts like a sponge; by capillary action, moisture is transported to living cells, thus allowing very rapid rehydration (fifteen minutes or so). This mechanism is very well-known because it is exactly that of the famous Jericho rose often encountered in commerce (*Selaginella lepidophylla*), a Lycophyte from the desert of Chihuahua (Mexico) that the English nicknamed "resurrection plant" as this mechanism seems miraculous.

Fig. 4. *Astrolepis sinuata*

Some species simply lose their fronds during dry periods, like the very common here *Polypodium cambricum*.

The prothalli of certain species also have the capacity to dry and then rehydrate; experiments have shown that they could survive after five years of drying; this seems impossible when we know the usual dependence of gametophytes on wet habitats.

Physiological adaptations

They are richly endowed with suitable adaptations to minimize water loss. Trichomes, hairs or scales distributed on the rachis and on the lamina reduce heat, maintain humidity at the level of the lower surface and protect the stomata (*Cheilanthes*, *Cosentinia*, *Paragymnopteris*, *Myriopteris*, *Astrolepis*, etc.). Some of them have this underside so covered with scales and hairs that touching

Fig. 5. *Cosentinia vellea*

them is like touching velvet or plush (*Cosentinia vellea*, Fig. 5), a bit like Lamiaceae adapted to the same type of environment (*Stachys* or *Phlomis* for example). These trichomes are crucial for rehydration, and also orm a barrier against possible phytophages. Others (*Aleuritopteris*, *Notholaena*, *Argyrochosma*) have a sort of floury protective wax composed of pigments (flavonoids), often white or yellow, always placed on the underside of the fronds. Its role would be to protect against ultraviolet rays, to reflect light [Diggs and Lipscomb 2014], and also to limit leaf transpiration. There are even some, such as *Notholaena standleyi*, which expose this wax by winding their fronds on themselves, thus reducing the leaf area; this shows that this material really acts as an effective barrier, as the exposed stomata are little affected. These plants often have small fronds, themselves subdivided into pinnules of tiny size, which reduces leaf transpiration by dissipating heat through the vacant spaces between the pinnules, unlike a frond offering a large continuous space (*Asplenium scolopendrium* type); this would accumulate above it a layer of stagnant hot air, which would limit exchanges with the surrounding air. The genus *Myriopteris* is particularly efficient, the pinnules of certain species being so small and so round that they resemble pearls, as in *M. lendigera* for example. Some species are also sclerophyllous, having fronds with a thick cuticle which limits damage linked to wind and drought, a very common adaptation in many Mediterranean plants but again infrequent in ferns. *Pellaea atropurpurea* is a fine example. Other adaptations exist, such as the bluish colouring (in the genera *Pellaea*, *Notholaena*, or *Argyrochosma* for example) (Fig. 6), which would help to resist strong light intensities; or even star-shaped scales (*Astrolepis*), distributed this time on the upper face of the frond and which would act a bit like the Bromeliad trichomes (*Tillandsia* for example) by capturing the slightest trace of moisture that occurs. Certain species, finally, produce a poison making them inedible to herbivores; *Astrolepis cochisensis* is an example.

Fig. 6. *Argyrochosma nivea* ssp. *nivea*

Reproductive adaptation

One of the most amazing adaptations in xerophytic ferns is, without a doubt, apogamy. The well-known reproductive cycle of ferns includes an asexual phase - the frond producing spores - and a sexual phase where, in the gametophyte developed from the germinated spore (the prothallus), fertilization takes place in the oosphere (female gamete) by an antherozoid (male gamete) reaching it thanks to its flagella; this herefore requires the presence of water at ground level in order to move. It is only after the oosphere has been fertilized that the sporophyte appears, and we return to the asexual phase.

This fertilization method partly explains the close relationships of ferns to wet habitats. However, to compensate for the scarcity of water in the environments where our xerophytic ferns grow, many have adopted apogamy (which is also found in about 10% of other ferns), a mechanism which consists of skipping the fertilization, the prothallus giving rise to a sporophyte without requiring gametes. This mechanism has the advantage of not being dependent on water, and in addition produces juvenile sporophytes growing faster and more vigorously than those from the conventional process, another advantage when the season favourable for growth is short. These prothalli are generally smaller than normal, perhaps to prevent water loss once again, or simply because they have no sexual organs. Apogamy is therefore a vegetative multiplication that hides behind appearances of sexual reproduction; this requires the production of spores with 2n chromosomes, therefore diploid like the plant which produced them, instead of being haploid (n chromosomes). Xerophytic ferns also include many triploid (3x) or even tetraploid (4x) species; this state (called polyploidy) is frequent in other Pteridophytes too, and can lead to the creation of new species. Finally, there are also some which have both apogamous polyploid and sexual diploid forms while belonging to the same species (*Pellaea ovata*, Fig. 7, for example).

Fig. 7.*Pellaea ovata*

Cultivation

My collection, which is about five years old, is made up of plants in pots or containers arranged outside (Fig. 7); I haven't found a suitable planting location. The pots also make it possible to move the plants, which thus pass from an airy and semi-shaded place in summer (to the east and under a *Ligustrum japonicum*) to another place in winter, always airy but this time facing south with, if necessary, a roof in case of overlong rainy periods.

Fig. 8. My collection of pots

Substrate

Draining is the watchword! I use a substrate composed of a mixture of fairly coarse potting soil rich in fibre and bark which, once passed through a sieve in order to remove the finest particles (<3mm), is mixed with a mineral (gravel / pozzolan / perlite / zeolite). The composition of this second part varies according to the requirements of the species (calcicole or acidophilic, with marked summer dormancy or not) and the stage of development of the subjects. The percentage of sieved potting soil / mineral part also varies between 60/40 and 50/50. The most important thing is that the water passes quickly through the mixture and that any stagnation is impossible; however, it must also have a certain retention capacity and good stability, because the differences between dry and wet must be as small as possible.

Watering

It should be moderate and well-calculated. As plants are outside, they benefit from the spring and autumn rain of the Mediterranean climate; the key periods are summer, when we must help the species with low dormancy capacity but let dry the most resistant (European species for example), and winter, when humidity must be avoided at all costs, especially combined with low temperatures. Except from natural rain, it is best to avoid wetting the fronds directly and to prefer watering at the base of the plant, because their foliage doesn't appreciate water. I prefer rainwater for sensitive and acidophilic species, well-water is fine for the others, which are the majority. You can even use tap water without risk for calcicoles, after having let it stand for a while.

Containers

Having not yet found the rock garden or the canyon of my dreams, my xerophytic ferns must tolerate pots or containers. These must be made of plastic, because terracotta pots lose water too quickly in my climate. On the other hand, English growers of these plants agree that the terracotta is the only material suitable for growing these plants in their humid climate. English growers often manage to maintain their xerics in pots buried in sandboxes and in alpine greenhouses; other places, other techniques! For the most sensitive species, however, I draw inspiration from them and use the double potting technique - an earthenware pot in a larger plastic pot; watering is done around the small earthen pot which soaks up and diffuses a moderate but constant amount of water to the plant (Fig. 9).

Fig. 9. The double pot technique used for *Pellaea calomelanos*

Light

Compared with more traditional ferns, the Pteridaceae xerophytes require much greater amounts of light, even if for some species a good indirect light can be enough. From autumn to spring they tolerate direct sunlight perfectly and can even be exposed to the south without too many problems; on the other hand, in summer it will be necessary to provide them with partial shade during the hottest hours of the day. A tree can do the trick, or a shade veil. To understand these requirements, just put yourself in their place, at the base of a large rock for example; the place is sunny during the periods of the year when the sun is low but during the summer, when is at the top of its course, they are in the shade of the rock, protected from the most intense rays. Another important consideration - they always need good ventilation, so in no case should they be left in a stuffy greenhouse.

Hardiness

It is difficult to generalize about the hardiness of these ferns, given their varied origins, but it can however be noted that they tolerate for the most part low temperatures (some, such as *Aleuritopteris argentea* (Fig. 10) or *Pellaea atropurpurea*, even very low) as long as they are not exposed to cold with intense humidity. -8°C completely dry will not be detrimental to them, while a 2°C in constant humidity will be terribly so. The American and European species that I have are very good in USDA zone 9, and some American ones could accept a USDA zone 8, or even less. On the other hand, I have been able to observe that South Africans are much more sensitive, some requiring winter protection (*Cheilanthes eckloniana* and *Cheilanthes quadripinnata*) and are therefore difficult to acclimatize outdoors. I have not yet tested Australian species; my plant of *Cheilanthes distans* is still too young.

Fig. 10. *Aleuritopteris argentea*

Fig. 11. *Myriopteris lendigera*
Photo: Quentin Aufrère

Multiplication

The spores of xeric ferns germinate rather well in general and give mature plants fairly quickly (one to two years after sowing). You can get spores from the well-known British Pteridological Society and the American Fern Society. Certain species with long, creeping rhizomes (*Myriopteris lendigera* (Fig. 11), *M. wootonii* and, to a lesser extent, *M. alabamensis* for example) can be propagated vegetatively by cutting rhizomes, but most are erect and compact in habit, and therefore not very suitable for division.

Conclusion

The search for ferns adapted to the place where I am living pushed me to evolve and adapt my cultural practices; the time spent in making these researches has largely been rewarded. These plants are little known, are not thought to be easy to grow, and are also little cultivated, at least to my knowledge, in France; here there is neither specific literature on the subject, nor plants in trade (except from Olivier Ezavin and his "Le Monde des fougères" nursery). Some European botanical gardens have collections (Ulm in Germany, Edinburgh in Scotland, Lyon in France); the most important are in the United States; for example, the Botanical Garden of the University of Berkeley in California, and the Missouri Botanical Garden in Saint Louis. It is, however, quite possible to grow these pretty little fronds with a little patience in a Mediterranean climate.

Fig. 11. *Notholaena standleyi*

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A Garden Escapee Leads to a New Identity

Bart Hendrikx

In the first months of 2015 an unknown fern was found in a former forest plantation by Sipke Gongrijp while doing a fern-oriented field study. This plantation, the Purmerbos, is located on the southeast side of the city of Purmerend. It mostly consists of poplar (*Populus sp.*), ash (*Fraxinus excelsior*) and willow (*Salix* sp.) on a rich clay soil. The undergrowth consists for the most part of nettles, brambles and Ground-Ivy (*Glechoma hederacea*). During a study in 2014 and 2015 a large number of rare and unusual ferns were found, such as *Polystichum setiferum, P. aculeatum* and its hybrid *P. x bicknelli*. Most noteworthy are the large number of representatives of members the *Dryopteris affinis* group that were found. Both ssp. *affinis*, ssp. *borreri*, ssp. *pseudodisjuncta* were found as well as a number of cultivars and both hybrids *D. x complexa nssp. complexa* and *nssp. critica*. The forest floor proved to offer the right conditions for germination because a number of escaped cultivated species have also been found - *Dryopteris erythrosora, Cyrtomium fortunei* and *Polystichum munitum*.

The unknown species of Dryopteris was originally identified as *Dryopteris kuratae*. Shortly thereafter, after looking at a few cultivated ferns, this was changed to *Dryopteris dickinsii* 'Incisa'.

Because *Dryopteris dickinsii* 'Incisa' is not grown at a commercial scale in the Netherlands, this escaped fern was a bit of an oddity. After some inquiries it turned out there used to be a larger fern nursery nearby, which might be the source for the fern spores. *Dryopteris dickinsii* 'Incisa' is not rare among the members of the Dutch fern society and may have been grown on a larger scale in the past. There are, however, no indications, that was the case.

In recent years researcher Dr Ben Zonneveld measured the DNA weights per nucleus (genome size) of more than 2350 species of the flora of The Netherlands (Forum geobotanicum (2019) 8: 24–78). He asked if I could provide material of *Dryopteris dickinsii* as this fern was recorded in the Netherlands as a garden escape. Material of both *Dryopteris dickinsii* and *Dryopteris dickinsii* 'Incisa' was sent, as this was the variety that was found in the Purmerbos. As it turns out *Dryopteris dickinsii*, which is known to be a diploid apomict species, measured 18.2 pg (picograms). The 'Incisa' measured 27.6 pg, which corresponds to a triploid taxon. Immediately the question was raised: What is the correct ID for his fern and where does the cultivar 'Incisa' originate from? And is it in fact a hybrid, which is suggested by it being triploid ?

Fig. 1. *Dryopteris dickinsii* 'Incisa' front of frond

Fig. 2. *Dryopteris dickinsii* 'Incisa' back of frond

Asking around amongst fern enthusiasts in both the UK, Netherlands and Germany led to the origin of the cultivar name 'Incisa'. In 1995 or 1996 three German expert fern enthusiasts visited the late Dr. Hennipman's garden in the Netherlands, in which they saw a fern labelled as *D. kyotensis;* they collected spores. As *'kyotensis'* turned out to a false, probably commercial, fantasy name, it was given the name *Dryopteris dickinsii* 'Incisa' because of its similarity to *Dryopteris dickinsii* and the more incised pinnae. The plant was easily grown from spores and distributed amongst enthusiasts. The plant grows larger and more vigorously than *Dryopteris dickinsii*.

Fig. 3. *Dryopteris dickinsii* 'Incisa' detail of the back of the frond

It proved impossible to determine when the original plant was introduced into cultivation. Both Hennipman and commercial growers searched the entire globe for new ferns. The name *Dryopteris kyotensis* and the similarity with *D*ryopteris *dickinsii* made me think this was a Japanese fern, and most probably a hybrid between *Dryopteris dickinsii* and a fern with, more or less, bipinnate leaves. I contacted both Prof. Iwatsuki as well as Mr. I. Yamazumi in Japan. In the reply it was agreed that the fern in question was surely a hybrid of Japanese fern species with *Dryopteris dickinsii* as a likely parent. *Dryopteris crassirhizoma* was the likely candidate for the other parent species.

D. dickinsii belongs to the section Hirtipes of the genus *Dryopteris* while *Dryopteris crassirhizoma* belongs to the section Dryopteris. If the fern in question is indeed this hybrid the correct name should be *Dryopteris* × *yasuhikoana* Sa. Kurata. However, this taxon is not (yet) mentioned on Plantsoftheworldonline.org or on The Plant List as an accepted taxon. Pictures of the hybrid on the internet do, however, show a strong resemblance with what we know as *Dryopteris dickinsii* 'Incisa'. With a bit of help from Google translate I found out that this hybrid was first published in J. Nipp. Fern. Cl. 2 (29): 7 (1977), nom. Nud .; Sa. Kurata & Nakaike, Ill. Jap. Pterid. 7: 334 (1994) , 8: 417 (1997), nn.

The DNA weight per nucleus (genome size) from *Dryopteris crassirhizoma* was also measured. Corresponding with literature it measured 18.2 pg. With *Dryopteris dickinsii* also being an apomict diploid the unreduced spores of *Dryopteris dickinsii* (2n) and the reduced spores of *Dryopteris crassirhizoma* could result in the triploid *Dryopteris dickinsii* 'Incisa'. The genome size of 27.6 pg does seem to correlate with 18.2 (2n) + 9.1 pg (n) The other way round would also fit. The only alternative so far as species were measured by BZ could be *Dryopteris wallichiana* with also 18.5 pg

So, for a lack of a better alternative *Dryopteris dickinsii* 'Incisa' should be referred to as *Dryopteris* × *yasuhikoana* cf. until further cytological study and confirmation about the identity of the other parent.

Acknowledgements:

I'd like to thank Dr. Ben Zonneveld for the measurements and comments on this article and Mr. I. Yamazumi for his help.

Fern Power

I wondered what ferns have to do with electrical services, so I contacted the owner from his web site.
It turns out that the owner is called Darren Fern. He kindly washed his van and took a few photos. Some members might recognise the background.
Who said that ferns were not electrifying!

A.E.G.

A Day at the Museum

Ian Unsworth

For Christmas, I was fortunate to receive a copy of the book *The Three-Legged Society* by Ian D. Hodkinson and Allan Steward (Fig. 1). The book looks at the lives of the Westmorland (now part of Cumbria) naturalists George Stabler, James M. Barnes, and Joseph A. Martindale, who together did much to further the knowledge of the natural world, and made some significant botanical discoveries. I had wanted to obtain a copy to learn more about James M. Barnes in particular, as he was a keen pteridologist with a number of fern cultivars named after him; *Dryopteris affinis* 'Barnesii' I believe is one such; this is still with us today.

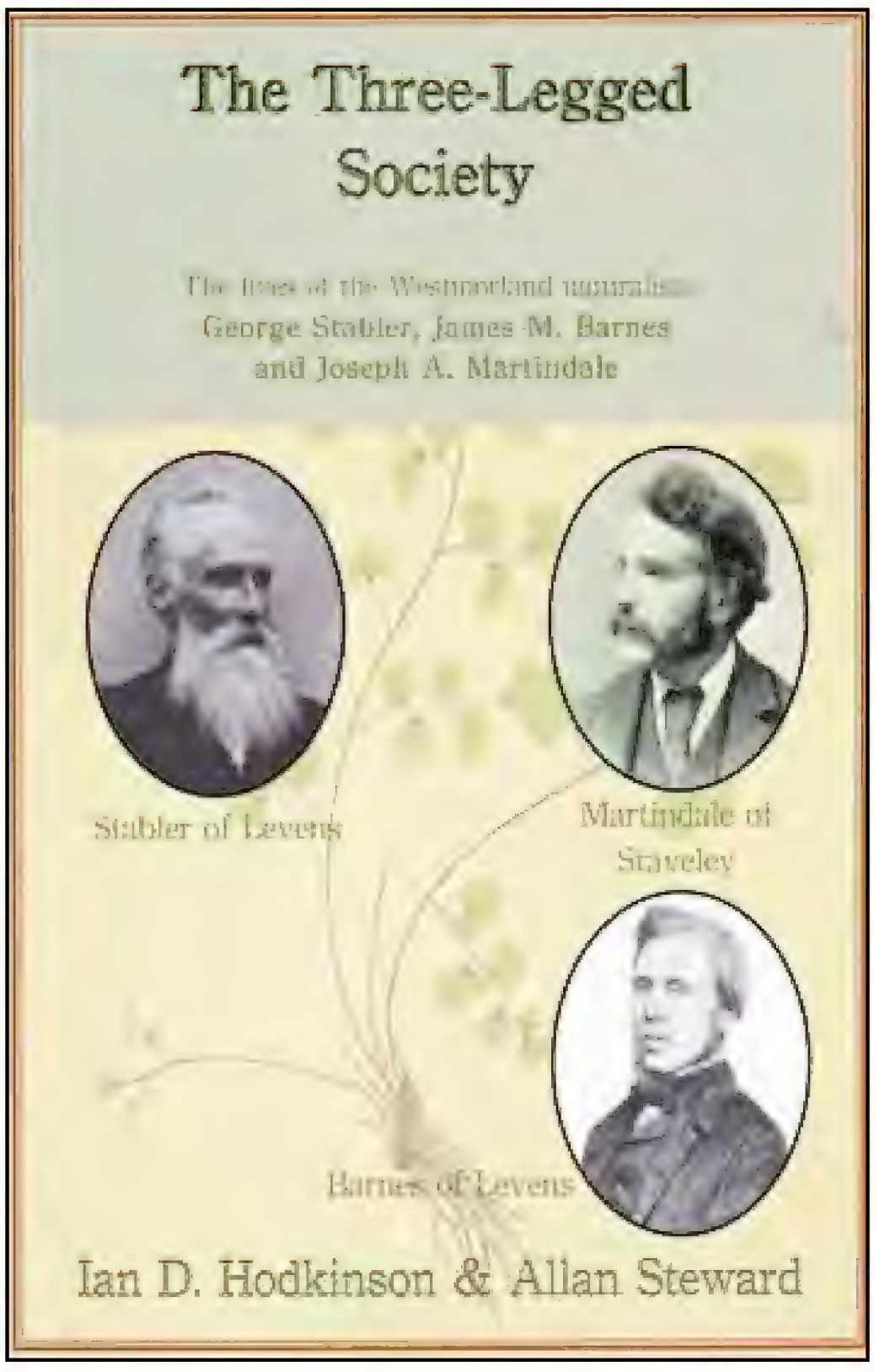


Fig. 1. *The Three Legged Society*

George Stabler, James M. Barnes, and Joseph A. Martindale had regular trips out into the local countryside searching for ferns, mosses, liverworts etc., and it was during these excursions that they made their remarkable finds. Barnes was initially interested in mosses, and there were extensive mosslands close to his house in the village of Levens. One of Barnes's more significant discoveries during this period was *Gemmabryum barnsesii*, commonly known as Barnes's Thread Moss.

During the fern craze or Pteridomania, Barnes became increasingly interested in ferns. An excerpt from *The Three-Legged Society*, tells us:-

> *"It was in the early 1860s that Barnes also became interested in ferns and this developed into the passion that was to dominate the rest of his life, culminating in his editorship of the second edition of Linton's The Ferns of the English Lake Country"* (Barnes 1878)

The fern species of the Lake District had largely been collected and catalogued by other naturalists, such as Fredrick Clowes, but Barnes set out to find cultivars of these species and bring them into cultivation. One such Athyrium, which Barnes discovered in 1860, was found in the parkland belonging to Levens Hall; the cultivar grew to around 8 or 9" (20 or 23cm) tall, and the fronds were an inch (2.5cm) wide. Barnes named it after himself. E. J. Lowe tells us that *Athyrium filix-femina* 'Barnesii' was:-

> *"a long narrow-fronded form. The pinnae, more properly speaking, are wanting, and their place substituted by wide, remarkably ragged, or laciniated pinnules, and a terminal larger pinnule".*

I have been aware of *Athyrium filix-femina* 'Barnesii' for many years, but, like most people, have only ever seen the image in Lowe's *Our Native Ferns*; the same image is used by Druery in his *British Ferns and Their Varieties*. While reading about the life of James M. Barnes in *The Three-Legged Society*, I came across a paragraph which stopped me in my tracks; on page 48 is written:-

> *"For a man with an abiding passion for ferns there is surprisingly little herbarium material of the many fern varieties that Barnes collected and cultivated. There is a small collection in Kendal Museum entitled 'Nine specimens of varieties of ferns from the neighbourhood of Kendal. Presented by Mr Barnes of Beathwaite Green December 6, 1861'"* (Fig. 2). It goes on to say *"Perhaps most significantly it contains fronds of D. filix-mas var. Barnesii and A. filix femina var. Barnesii"*

Keen to view *Athyrium filix-femina* 'Barnesii' and see what the real fern looked like in the flesh, so to speak, I immediately found Kendal Museum's website and sent off an email. Several days later I received a lovely reply from Carol Davis, who is the museum's curator; I was more than welcome to visit the museum and view the *Athyrium filix-femina* 'Barnesii' (Fig. 3) and the other specimens in the Barnes herbarium collection. The Clowes herbarium, which also resides at the museum, contains a surprising number of cultivars, so I asked to view these specimens also. The Northwest Group of the British Pteridological Society has, at some point, assisted in the collation and cataloguing of the herbarium collections held at the museum. I made the journey to Kendal.

Kendal Museum was founded in 1796 by William Todhunter, who exhibited collections of fossils, minerals, animals, plants, and antiques. In 1835 the Kendal Literary

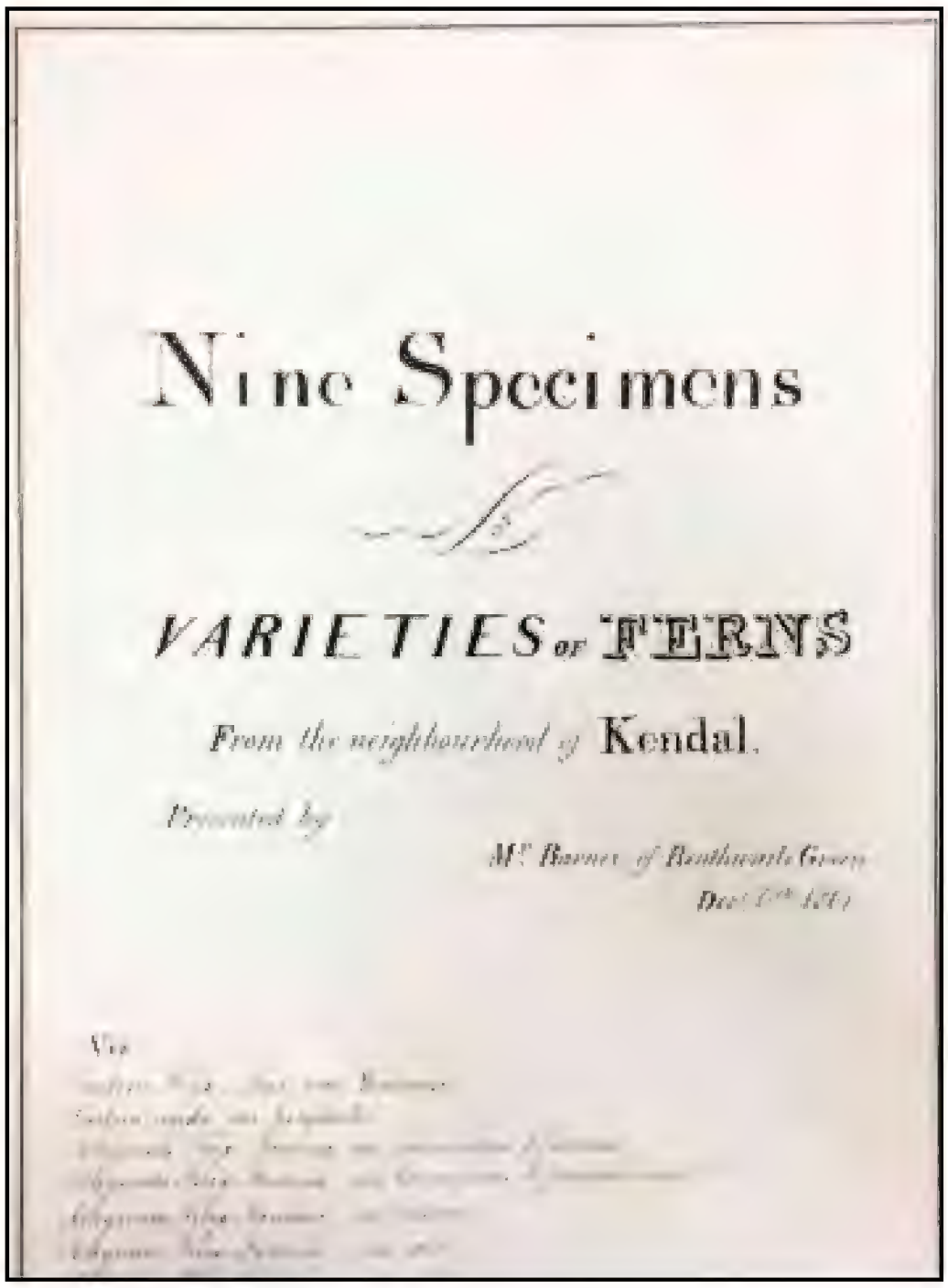

Nine Specimens
of
VARIETIES of FERNS
From the neighbourhood of Kendal.
Presented by
Mr Barnes of Beathwaite Green
Dec 6th 1866

Fig. 2. The collection from Mr. J. M. Barnes

Fig. 3. The herbarium specimen of *Athyrium filix-femina* 'Barnesii'

and Scientific Society took over the running of the museum, but by 1900 money problems forced the sale of some of the exhibits. Kendal Town Council took over the running of the museum until recently when, due to budgetary cuts, the council has had to pull out; fortunately Kendal College has stepped in and taken over the running of the museum, albeit on a reduced budget.

The museum is an absolute treasure trove of all things interesting, from fossils and minerals to fish and amphibians, an extensive stuffed mammal & bird collection, a collection of artefacts from ancient Egypt and much local interest. Carol was very welcoming and showed me into the room that holds the herbaria in which is a table for the collections to be inspected. The Barnes collection is now almost one hundred and sixty years old and is quite fragile; each specimen has had to be placed in a clear plastic sleeve to help protect it from degradation.

The museum also holds herbarium collections from J. A. Martindale (flowering plants), George Stabler (mosses, liverworts and ferns) and the collection of George Pinder (ferns and horsetails) The Barnes collection contains two specimens of Lastrea (now Dryopteris) and seven specimens of Athyrium cultivars. The Clowes collection is considerably larger, containing seventy-three specimens overall, seven of which are Athyrium, thirteen Polypodium, twenty specimens of what is now Dryopteris, seven *Asplenium scolopendrium* and many more. The Athyrium cultivars from both collections were all completely new to me and are unfortunately not with us today, so my knowledge, as a consequence, was greatly enhanced.

A somewhat flowery excerpt about Mr. Barnes appeared in the Westmorland Gazette and Kendal Advertiser on December 8 1866,

> *"When I tell you that this diligent student has added about a hundred entirely new forms to the list of known varieties of ferns, you will have some idea of the good which may be done by one man; and when I tell you that some of them are the most beautiful specimens of the fern tribe which have ever been found in this country, you will agree with me that Mr. Barnes has done no little service by bringing to the light beauties in nature which might otherwise still have blushed unseen, instead of affording, as they now do, so much pleasure not only to numerous admirers of ferns, but to all who can appreciate the beauties of foliage".*

James M. Barnes died on the 9th May 1890 but little appears to be known about what became of his fern collection thereafter, although *The Three-Legged Society* tells us :-

> *"His garden and collection appeared still to be in good order in 1897 when visited by C.T. Druery, being maintained by his second son James Martindale Barnes and family". After this date much of the collection appears to have faded away, possibly just through lack of time to care for it, or possibly ferns were given away. "*

On a garden-visiting trip with the Cultivar Group in August 2018, visiting private gardens in the south Cumbria area and searching for lost cultivars, the day turned out to be particularly profitable as one of the gardens visited had a plumose *Athyrium filix-femina* growing in it which closely resembled 'Plumosum Barnes' (Fig. 4.). This cultivar

had been found by Mr. Barnes in 1862 growing wild near Milnthorpe railway station but like Barnesii had been lost for many years. *Athyrium filix-femina* 'Plumosum Barnes' was said to grow to about 2'9" (84cm) in height; it had a red stipe and rachis. It was one of the very few plumose Athyriums believed to be completely sterile. As well as resembling the growth habit of 'Plumosum Barnes', our find matched this description, confirming that this fern could indeed be 'Plumosum Barnes'.

It would be remarkable if *Athyrium filix-femina* 'Barnesii' is still growing in a garden somewhere - it must have been lost for a considerable number of years -but after seeing what *Athyrium filix-femina* 'Barnesii' looks like, Julian Reed told me he has three pots of Athyrium growing in his greenhouse which closely resemble 'Barnesii' and he was considering throwing them away until he realised their resemblance. Could it be we have 'Barnesii', or something very similar, growing in our Athyrium collections once again?

References:

Kendal Museum history: http://www.kendalmuseum.org.uk/about-us/history-of-the-museum/

Hodkinson I.D. & Steward A. (2012) *The Three-Legged Society* Regional Heritage Centre (Kendal Museum)

Lowe E.J. (1865) *Our Native Ferns* London Groombridge and Sons

Fig. 4. An *Athyrium* that closely resembles 'Plumosum Barnes'

'Ferntastic' Macramé

Macramé, according to Wikipedia is:-

A form of textile produced using knotting (rather than weaving or knitting) techniques.

The creator of these fern anklets and wristlets is Franzi Holz. They appeared on a facebook group page 'Ferns, lichens and mosses'

Franzi writes:

I'm Franzi and I am the "MakrameeFee" from Germany. Since the October of last year I have started my new hobby "Macramé".

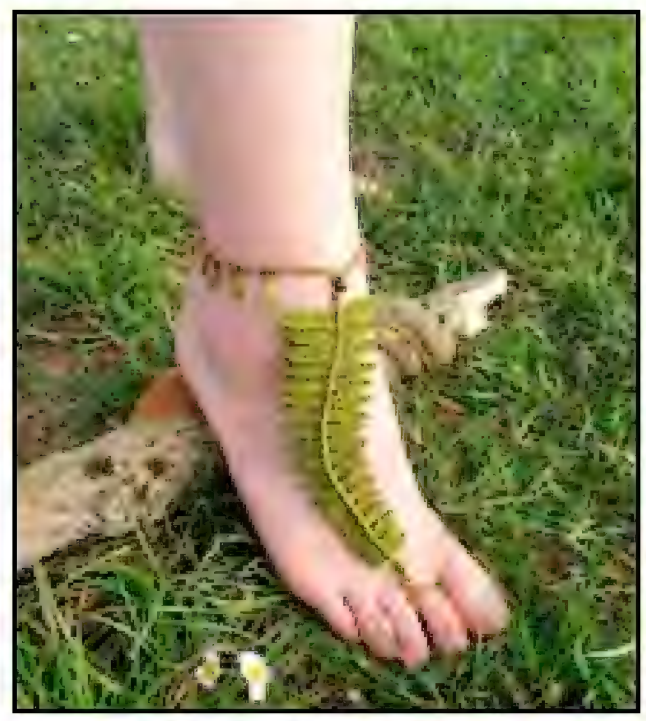
Macramé is fine handwork where you use special waxed yarn to knot as jewellery or hanging baskets for plants.

I'm a great fan of nature and got inspired by spring and the rising fern.

Since ferns are my favorite plant,I thought a lot about how this could be seen in my work and so this beautiful fern jewellery was made.

You can find me on Instagram/Facebook @makrameefee

AEG



Some Fern Observations in Natural Sites in North Western America

Rolf Thiemann

The Pacific North West of America is one of the hotspots for hardy ferns. Some time ago my wife and I visited Western Canada and the adjoining US states, Washington and Montana. Our main motive was visiting the Canadian Rocky Mountains with its national parks Banff and Jasper. However, other national parks presented themselves as goals along our way. Fern botanising was not one of our main aims as September was not the the right time of year for it, so we intended to content ourselves to spotting ferns by chance. Considering this and the late season, we nevertheless spotted some interesting ferns and were able to study their natural growing situations. Seeing plants in their natural habitat helps sometimes in recognising the reasons why we are unsuccessful in their culture in the garden.

The tour started in Seattle and at the wonderful Rhododendron Species Botanical Garden (which also contains the fern collection of the Hardy Fern Foundation). Under the leadership and great hospitality of Sue Olsen, the late Loyd Jacobs, Richie Steffen and Rick Peterson, the simply magnificent Elizabeth Miller Garden was created (Fig. 1). Knowing that entry numbers are restricted under a covenant, we especially thank all of them and especially Richie Steffen the director, for allowing us to visit.

Fig. 1. The Elizabeth Miller Garden
Photo: Richie Steffen

Two days later we went to Canada; *via* Vancouver and Whistler we reached Jasper and later Banff National Parks.

Reaching the western front of the Canadian Rocky Mountains, we had a look at Rearguard Falls. On the short way to the view point we spotted *Equisetum scirpoides* together with *E. hyemale*. I was surprised to discover that *E. scirpoides* can grow in a dark forest (Fig. 2).

Fig. 2. *Equisetum scirpoides* together with *Equisetum hyemale*, Rearguard Falls., British Columbia

The most interesting ferns in Jasper National Park we found on a rockface beside the Athabaska River. In crevices and holes in the rocks two Woodsia species grew: *W. alpina* and *W. scopulina* (Fig. 3, 4, 5). The latter we found again near Moraine Lake in Banff National Park.

Figs 3. and 4. *Woodsia scopulina*, Athabaska River, Jasper National Park, Alberta
Fig. 5. *Woodsia alpina*, Athabaska River, Jasper National Park, Alberta

In a swampy forest between Banff City and the Vermilion Lakes lies a paradise for equisetum lovers. We discovered it on a walk to see moose at the lake shore. The three Equisetum species we found here were *E. hyemale, E. scirpoides* and *E. arvense*. The latter two species in this forest were competing with one another for dominance (Fig. 6). As at Rearguard Falls, *E. scirpoides* was growing in forest shade but it also grew on a river bank in full sun. In contrast to the plants in the shade we could see here many with stems with strobili (Fig. 7).

Fig. 6. *Equisetum scirpoides* with *Equisetum arvense,* Vermillion Lakes, Banff

Fig. 7. *Equisetum scirpoides* with strobili, Vermillion Lakes, Banff

The middle of September had passed and the Indian summer had begun to paint the landscape with its beautiful colours. This was satisfying compensation for the lack of flowers at this autumn time (Fig. 8).

Fig. 8. Golden autumn at Mount Wilson, Banff National Park

Only very few prominent flowers could still be seen, like the abundant Leafy Aster, *Aster foliaceus,* and a lonesome Alpine Paintbrush, *Castilleya rhexiifolia*. I was surprised to see in some places Shrubby Cinquefoil, *Dasiphora (Potentilla) fruticosa*, on the overgrown banks of Athabaska River. I had not realised until that time that the Rocky Mountain area was the home of this widespread plant of European gardens.

Leaving Banff we followed the eastern foothills of the Rockies southwards to Montana and the American Glacier National Park. On the Hidden Lake Trail at Logan Pass we spotted as well as common ferns a large stand of *Cryptogramma acrostichoides* (Fig. 9).

Fig. 9. *Cryptogramma acrostichoides*, Hidden Lake trail, Logan Pass, Glacier National Park, Montana, U.S.A.

Returning to Canada, we reached the Trans Canada Highway *via* Cranbrook and Radium Hot Springs at Golden, British Columbia. Following the highway westwards took us to the Canadian Glacier National Park in the Selkirk Mountains. After passing the Rogers Pass directly beside the Trans-Canada Highway we came across the interesting Hemlock Grove Trail leading into the deep rain forests of this park. The rain forests here are the most eastern ones in Canada and are dominated by Western Red Cedar, *Thuja plicata*, and Western Hemlock, *Tsuga heterophylla*. The very wet ground was dominated by Devil's Club, *Oplopanax horridus*, but we spotted a large population of *Gymnocarpium disjunctum* too. The fronds exhibited all phases of autumn colour from green to white (Fig. 10). Here *Athyrium filix-femina* and *Dryopteris expansa* also occurred.

Fig. 10. *Gymnocarpium disjunctum*, Hemlock Grove trail, Glacier National Park, Montana, U.S.A.

We travelled back to Washington State *via* Revelstoke and the Okanagan Valley. Our next goal was Mt. Rainier. On rocks in the forests in the foothills of this volcano we spotted nice clusters of *Adiantum aleuticum*, often accompanied by *Polypodium glycyrrhiza*. At one place we saw a polypodium as large as *P. glycyrrhiza* but it wasn't this species (Fig. 11). Spores were abortive – a hybrid between *P. glycyrrhiza* and another polypodium?

Fig. 11. Unidentified polypodium, Mount Rainer National Park, Washington State, U.S.A.

In the higher elevations of the mountain at the tree boundary we saw no interesting ferns to mention, but we were compensated by the spectacular autumn colour of the myrtillus and willow shrubs – a colour explosion of purple-red and golden yellow (Fig. 12). We were at the right place at the right time!

We spent the last week of September on the Olympic Peninsula. Most of the peninsula is national park and covered with rain forests. The high rainfall promotes ferns and they grow more luxurious here than elsewhere in the Pacific coastal area. The most common fern is *Polystichum munitum*. This fern feels so much at home here that it suppresses all other herbaceous plants in many forests (Fig. 13).

Fig. 13. Luxuriant growth of *Polysticum munitum*, rainforest near Lake Crescent Lodge, Olympic National Park, Washington State

Fig. 12. Indian summer above Jackson visitor centre, Paradise, Mount Ranier National Park

It also dominates the road verges even though they are mowed regularly (Fig. 14). A very common fern on wet rocks near creeks and waterfalls is *Adiantum aleuticum* (Fig. 15); drier places are settled by *Polypodium glycyrrhiza* (Fig. 16).

Fig. 14. *Polysticum munitum* by the side of highway 101 near Lake Crescent, Olympic National Park

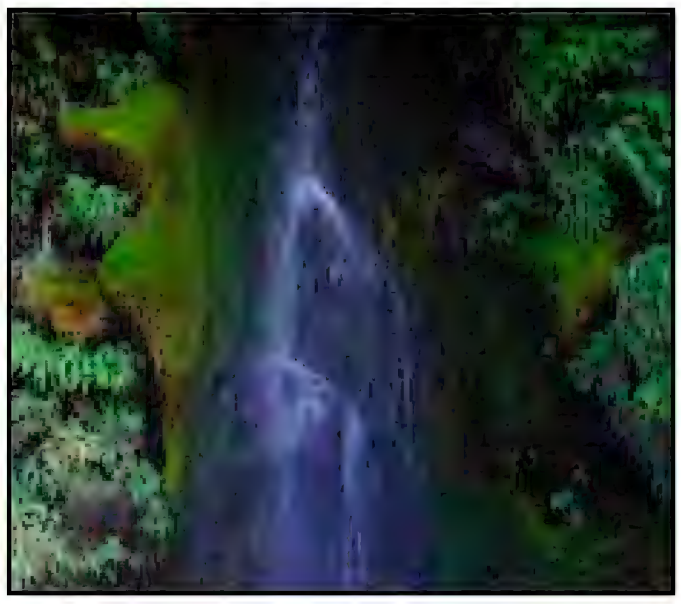


Fig. 15. A nameless waterfall with *Adiantum aleuticum*, highway 101, near Lake Crescent National Park

Fig. 16. *Polypodium glycyrrhiza* near Lake Quinault, Olympic peninsula

In books, touristic literature etc. you will always find pictures of the Hoh Rain Forest (Fig. 17) and especially the Hall of Mosses, with its large curtains of mosses hanging from the trees, a notable feature of the Olympic National Park (Fig. 18).

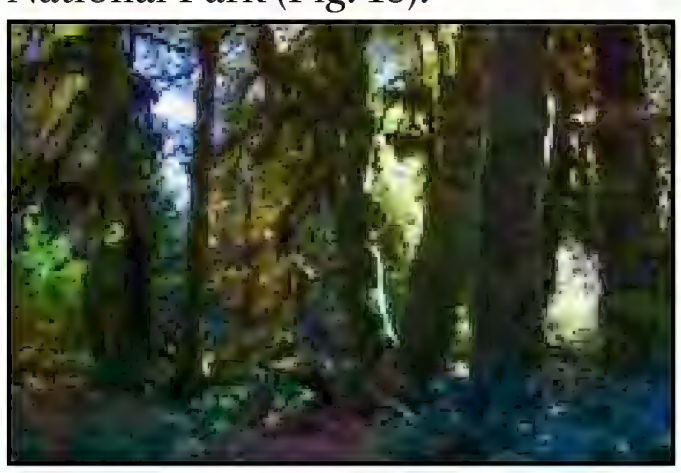


Fig. 17. The Hall of Moses, Hoh Rain Forest, Olympic National Park

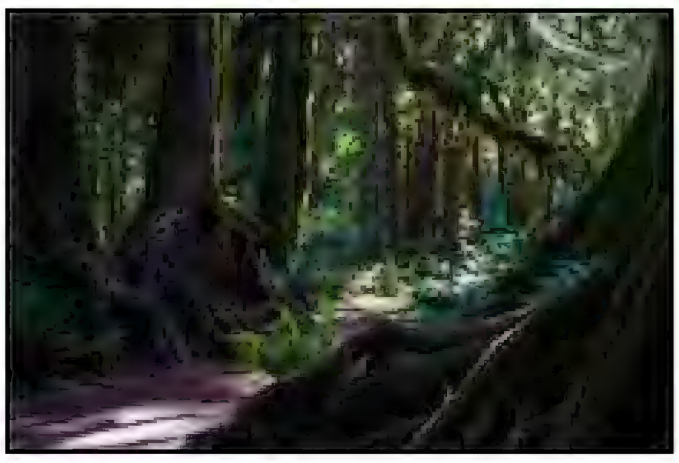


Fig. 18. The fabulous Hoh Rain Forest, Olympic National Park

Formerly, I often wondered why these curtains are only large in this particular forest when all the other parts of the forests seem the same, having only smaller moss curtains. The answer to the riddle is discovered if you look more closely at the larger moss curtains. Only here the moss is interwoven with *Selaginella oregana*. The shoots of the selaginella are much more tenacious than the moss and keep the curtain together (Figs. 19, 20, 21).

Fig. 19. *Selaginella oregana* and *Polypodium glycyrrhiza,* Hall of Moses, Hoh Rain Forest

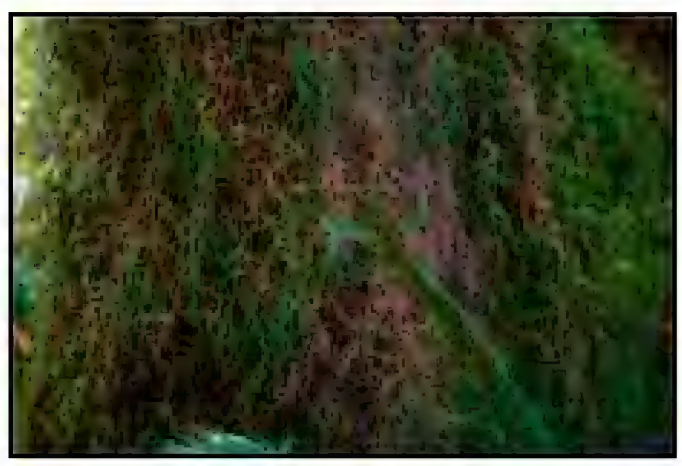


Fig. 20. *Selaginella oregana*, Hall of Moses

Fig. 21. Close up of *Selaginella oregana*, Hall of Moses

Pure moss curtains tear down when they become too long. Another selaginella we spotted on Hurricane Ridge at higher elevation in the centre of the peninsula, *Selaginella densa*, grew here on a rock (Fig. 22). We also saw *Gymnocarpium disjunctum* again in some places (Fig. 23).

Fig. 22. *Selaginella densa*, Hurricane Ridge, Olympic National Park

Fig. 23. *Gymnocarpicum disjunctum*, Olympic National Park

The last fern we saw on the trip was *Polypodium scouleri*. It was growing in the trees directly on the beachline in full sun and with permanent salt spray from the ocean. A very unusual growing situation for a fern. However, the large clump looked very healthy, the fronds being very hard and leathery (Fig. 24).

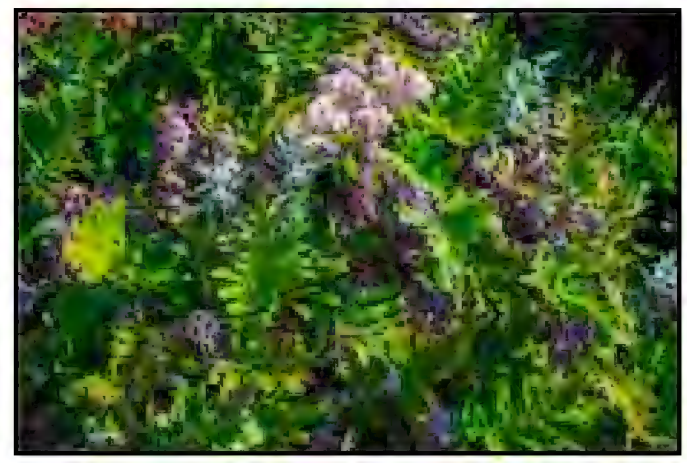


Fig. 24. *Polypodium scouleri*, Beach 4, Olympic peninsula

Acknowledgements

I want to thank Pat Acock (St. Mary Cray) for preparing the text prior to publication.

The Japan Tour (Part 2)

Alice Taylor, Daniel Yansura, Paul Ripley, Pat Riehl, Pat Acock,

Continued from page 32.

Tuesday 5 November From Osaka to Amami.
Alice Taylor

Our fifth day in Japan began with a morning flight to Amami Oshima, a large and beautiful island in the volcanically-formed Amami archipelago, situated in Japan's subtropical south west. Upon arrival at 11:00am we were met by our driver, who took us to the Oshima Tsumugi textile museum. Tsumugi is a kind of woven silk textile which has a 1200 years history of production on Amami Oshima. Uniquely, the silk is dyed into patterned strands using Amami mud and pigments from the palm, *Raphiolepis indica* var. *umbellata*. This laborious process takes ten months to produce enough dyed silk to make a kimono. Oshima Tsumugi kimonos are, somewhat unsurprisingly, the most expensive in the world.

Fig. 1. A man processing the fabric used for making kimonos amongst natural *Cyathea lepiferum*

Photo: Chitra Parpia

Before heading to the Amami nature observation forest (a c.500-year-old forest of c.200 plant species), we stopped for lunch and were served a delicious native Amami dish called Keihan; a kind of chicken broth with rice, papaya, mandarin zest, egg and anything else which pleases you. Our guide to the forest, Kawabata-san, was not exclusively interested in ferns and showed us some of the more interesting angiosperms of the island: two rare and over-collected orchids – *Sedirea japonica* and *Vanda falcata;* the huge-leaved *Alocasia odora* (for any fans of the Studio Ghibli films, it is one of these leaves which the forest spirit "Totoro" uses as umbrella in the famous scene); *Symplocos microcalyx*, the sweet young leaves of which are chewed by children when sweeties are scarce or withheld; *Mitrastemmon yamamotoi* , an eerie looking parasite which makes up half of the Mirastemmonaceae family, the other member of which is endemic to South America; and *Castenopsis sieboldii,* a tree which is the keystone to much of the ecology of the forest – in life, a host and provider for other plants, insects and native pigs; in death, to glow-in-the-dark fungi (and other things, of course).

Fig. 2. The charming once pinnate *Diplazium donianum*

Photo: Dan Yansura

Fig. 3. Mr Yamazumi demonstrates the strength of St Thomas' Bean (*Entada phaseoloides*)

Photo: Chitra Parpia.

Among the ferns we saw in this forest were: *Cyathea lepifera* (the "Flying spider-monkey tree fern"), the first of four *Cyathea* species we were to see on the island; the closely related *Asplenium nidus* and *A. antiquum*, the latter of which is endangered and can be distinguished from the former by its having sori which extend almost to the leaf margin and leaves of almost uniform width; and the highly variable *Lindsaea orbiculata* (and a named variety thereof *L. orbiculata* var. *commixta*). Other ferns seen were: *Lemmaphyllum macrophyllum* var. *obovata*, *Microlepia strigosa*, *Leptochilus wrightii*, *Angiopteris lygodiifolia*, *Leptochilus neopothifolius*, *Dryopteris sordidipes*, *Bolbitis subcordata*, *Diplazium amamianum*, and the fluffy and not-at-all-parasitic *Thelypteris parasitica*. Our day ended with the incredible sight of an entire hillside of wild-growing *Cycas revoluta*.

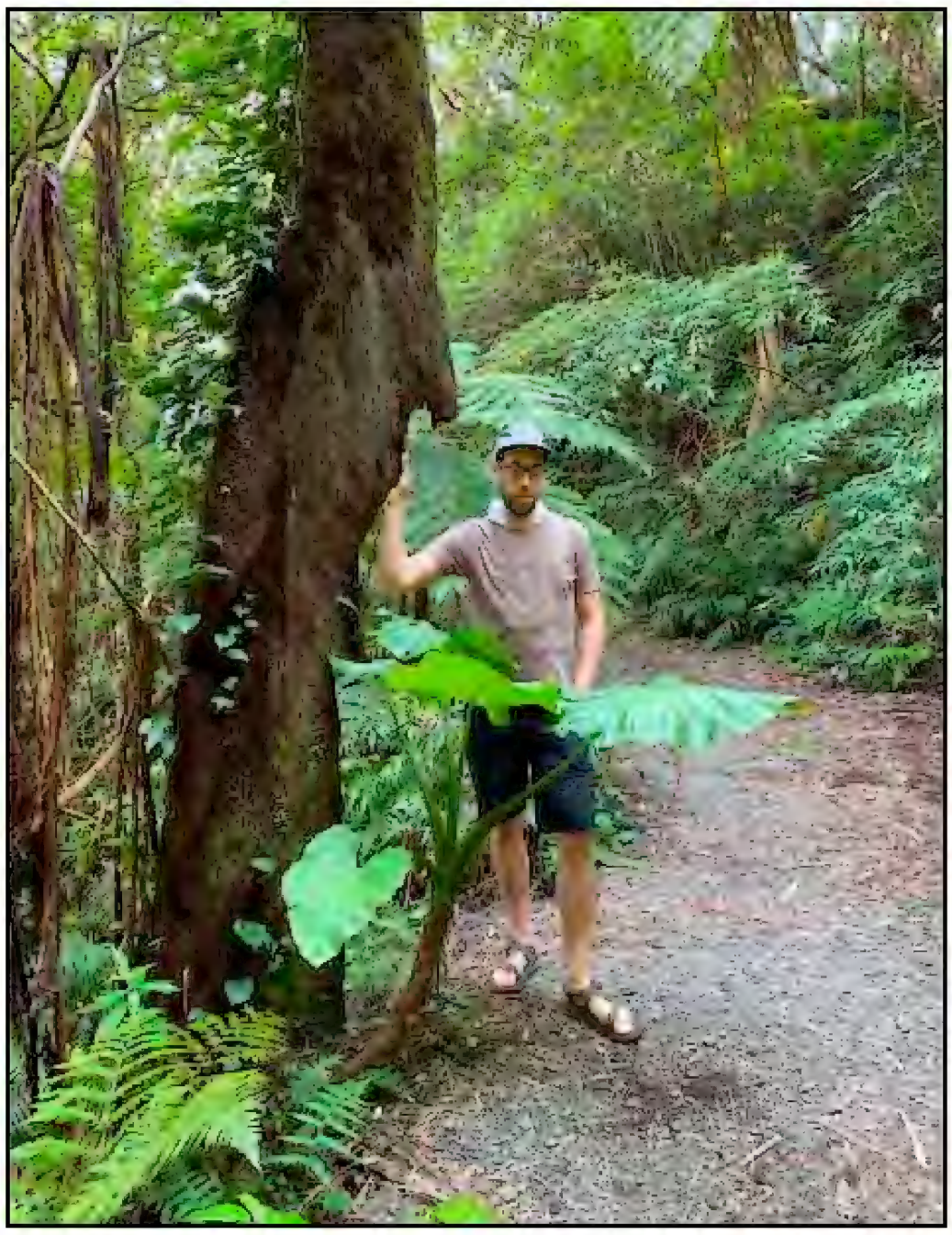


Fig. 4. Asher Ramsah shows how *Cyathea lepiferum* forms buttresses as it grows taller.

Photo: Pat Acock

Fig. 5. *Lindsaea orbiculate* var. *commixa*

Photo: Pat Acock

Wednesday 6 November Kinsakubaru Primeval Forest Daniel Yansura

Our destination for the morning was a primeval subtropical forest high in the mountains (28°20'57.9″N, 129°26'59.6″E). Kinsakubaru Forest is isolated, underdeveloped, and is part of Amamigunto National Park, where all visitors are required to have accompanying guides. Our guides met us near the town and drove us in their vans up into the mountains. We quickly entered rainforest and on the steep slopes saw the usual ferns, the scrambling *Dicranopteris linearis* and *Diplopterygium glaucum*. *Angiopteris lygodiifolia* grew on the horizontal surfaces near the road. We finally stopped and parked adjacent to two medium-sized tree ferns, both *Cyathea lepifera*. We had to hike a few kilometres on a wide trail bordered with a wonderful variety of ferns to reach the actual gate into the Kinsakubaru Forest.

Fig. 6. Mr Yamazumi proudly shows his ferning pocket jacket elaborately embroidered with an exquisite Equisetum design by Mrs Yamazumi.

Photo: Chitra Parpia

On the unfortunately brisk walk to the entrance we were only able to identify a number of these ferns. These including *Blechnum orientale (Blechnopsis orientalis)* with orange-reddish new growth, *Dryopteris koidzumiana*, *Odontosoria chinensis*, *Deparia lancea*, *Diplazium dilatatum*, *D. amamianum*, *D. incomptum*, *Leptochilus neopothifolius*, *Thelypteris angustifrons*, *T. triphylla*, *Nephrolepis cordifolia*, and the rare and unusual simple-fronded *Cheiropleuria integrifolia*. In the trees we would occasionally see *Asplenium nidus*, easily distinguished from *A. antiquum* by the linear sori that only extend halfway across the fronds. A rare find for us was the trunkless tree fern *Cyathea metteniana* near the side of the trail, and the more

abundant *Cyathea spinulosa* was prevalent in the understory and easily identified by its black stipe and rachis. By the time we reached the official entrance to the Kinsakubaru Forest, we had identified most of the ferns we would see this morning. Our guides led us further uphill to a 150-year-old oak tree, where we stopped for a rest and to hear about the forest. Before we started our return, Mr. Yamazumi pointed out *Diplazium donianum*, a small attractive fern with mostly 3-5 large pinnae forming a colony near the oak tree.

Fig. 7. *Bolbitis subcordata.*

Photo: Pat Acock

We returned, again rather too quickly, along the trail back to our vehicles, stopping occasionally to observe some ferns we were particularly interested in. I personally was hoping to find fertile fronds on *Cyathea lepifera*, and was a bit disappointed to not see any, despite there being a few dozen of the tree ferns along the trail. (The Kinsakubaru Forest is known to have many of these tree ferns.) When I finally reached the parking area, I was relieved to see that the first two tree ferns I had seen near our parked vehicles had several fertile fronds.

After a delicious Japanese lunch, we headed to the Okawa Dam Lake (28°20'43.2″N, 129°29'04.4″E) for a more leisurely walk in an area rich in ferns. The welcome slow pace allowed us to spend more time observing individual plants. The trail was actually an unused dirt road with a rather steep incline on one side, with many cascading ferns. *Thelypteris acuminata, T. parasitica,* and a hybrid between them were the first we noticed. *Lindsaea orbiculata, Odontosoria chinensis, Deparia lancea, Nephrolepis biserrata, Selaginella limbata,* and *S. lutchuensis* grew on the steep upward slope, while *Pteris fauriei, P. semipinnata*, the giant fan-shaped fern *P. wallichiana*, *Microlepia strigosa, Angiopteris lygodifolia, Leptochilus neopothifolius, Deparia petersenii, Diplazium amamianum, Blechnum orientale (Blechnopsis orientalis)*, and the large elegant *Lycopodiella cernua* grew on the more horizontal surfaces. A rather unusual find was large colonies of an *Ophioglossum* species growing right on the road in an organically poor clay/sand soil. We observed that these plants had underground bulbs that were connected to each other by thick fleshy roots to form the large colonies. Finally, as we approached the dam, we could see tree ferns across the lake, which appeared to be *Cyathea lepifera*, growing in full sun.

With daylight starting to fade, Kazuo herded us back to our bus, and it was dark by the time we reached our hotel.

Thursday November 7 Modama Natural Habitat, Santaro Pass Road Stops, Amami Mangrove Park & Funangyo Waterfall Pat Riehl

Our first stop this morning was at the edge of the Modama Natural Habitat (28°17'22.1″N, 129°26'02.3″E). We were again warned about snakes and to stay on paths, which was always curious because we immediately had to work our way over large boulders and climb through lots of vines.

One vine shown us by Mr. Yamazumi as we left the coach was *Entada phaseoloides.* Commonly known as St. Thomas's Bean, it is a large evergreen woody climber with flattened spiral branches. It uses trees as support to climb into the tree canopy. A member of the Legume family it produces one of the largest seed pods of all, often measuring 100cm long by 12cm wide. It is poisonous but also used to wash hair, clean clothes and kill fish.

We came to look at *Coniogramme gracilis*, which we found in great abundance. While *C. gracilis* is available in nurseries in the USA it was interesting to see it growing in the wild. Also on and around the boulders just off the road were *Angiopteris lygodiifolia*, *Microlepia strigosa* and *Lygodium japonica.* There was also a splendid *Macrothelypteris torresiana* on a roadside shoulder.

A short distance further along the Santaro Pass Road (28°16'13.3″N, 129°26'05.5″E), I indulged in one of my favourite pleasures, roadside botanising. On a rocky hillside we were shown *Arachniodes yakusimensis;* it was only when I discovered that this was a synonym for *A. amabilis* var. *amabilis* that I was able assimilate this information. Another interesting fern was *Diplazium donianum*, a pinnate *Diplazium* with the more usual linear twin sori. At the furthest point of our road walk we came across a glade of *Cyathea lepifera* amongst which was a *Cyathea spinulosa* (28°16'14.7″N, 129°25'40.4″E). Close by on a flat roadside edge was a lovely colony of *Thelypteris triphylla* var. *triphylla.* We were also introduced to *Cyathea metteniana*, which rarely has a trunk and then only up to 60-80cm. Before getting on the bus we had a short class looking at *Thelypteris augustifrons, T. cystopteroides* and the hybrid between them.

We had a delightful lunch in Amami Mangrove Park, the second largest mangrove swamp in the whole of Japan; it is used both as a scientific resource to study the ecology and a pleasure park to kayak around the small streams filtering into the sea loch. We made our way up to a lookout tower along a board walk. Unable to resist ferning, I spotted on a tree *Psilotum nudum* (28°15'37.1″N, 129°24'32.3″E). This is an odd-looking fern that does not produce true fronds (leaves). The branching triangular-shaped stems do all the photosynthesis work. Small bulbil-like structures along the stem contain the sporangia. I gather they can become a weed very easily in tropical fern houses.

Our final stop of the day was at Funangyo Waterfall (28°18'35.5″N, 129°25'26.3″E). Here in the gathering gloom of dusk we had to move quickly, as our driver was almost out of time, but we were able to see the magnificent *Diplazium amamianum* well enough to photograph. As well as the ferns we were becoming accustomed to we also saw beautiful specimens of *Arachnoides exilis*, *Selaginella doederleinii*, *Bolbitis subcordata* and were introduced to *Leptochilus neopothifolius*.

Fig. 8. Evening entertainment in Amami

Photo: Pat Acock

Fig. 9. The height *Cyathea lepifera* can reach captured well by Fernando Orellana

Friday November 8 Kakeroma Island Paul Ripley

Morning clouds disappeared to give us a fantastic sunny day for our trip to Kakeroma Island, to the south of Amami. An hour's drive to Koniya saw us take the ferry across clear deep blue water to Seso.

Our first stop along the road (28°07'18.6″N, 129°14'18.6″E) enabled us to see *Woodwardia prolifera*, some with bulbils apparently randomly placed over the upper face of the frond. This species is diploid, compared with the tetraploid *W. orientalis* we had seen previously. Also here was *Lindsaea orbiculata*, *Osmunda banksiifolia* (with fertile fronds), a bank of *Lycopdiella cernua*, and *Cyathea metteniana*, among others.

At the next location (28°07'03.1″N, 129°13'49.9″E), we saw *Pteris ensiformis* for the first time, along with *Lygodium japonicum* var. *microstachium*, and *Cyrtomium falcatum*, among others we had seen previously.

Above Nishiamuro, we stopped at a viewpoint above the village (28°06'37.6″N, 129°13'20.0″E) and saw *Odontosoria biflora*. This fern only grows near the sea and is neater and thicker in texture than *O. chinensis*. To my mind the sori are slightly further from the pinna tips than in *O. chinensis*.

In Nishiamuro we walked through the village, viewing an "open garden" where the owner had for some reason taken the opportunity to plant non-ferns (and even attractively-arranged non-plants). We called in at the village primary school, where the charming

Fig. 10. Asher teaches the children in school on Kakeromajima Island the word fern. Photo: Pat Acock

children hopefully enjoyed our visit as much as we did, before picnicking above the beach. Asher, Dan (M) and I had an extremely brief dip in the clear and warm South China Sea. I obtained some stamps in the Post Office, amazed that this tiny village should have a post office staffed by 2 people.

Around the coast (28°07'15.3″N, 129°15'59.8″E) we made a short detour to see a concealed bunker where the kamikaze torpedo boats were hidden during World War II. Near here, Mr. Yamazumi pointed out to us the hybrid between *Odontosoria chinensis* and *O. biflora.*

After taking the 1420 ferry back to Nishiamuro, we drove to a viewpoint above the town with spectacular views of the neighbouring islands (28°10'31.1″N, 129°18'45.4″E). Taking the opportunity to review some of the commoner species, I noted *Deparia petersenii, Thelypteris parasitica, T. acuminatus, T. cystopteroides, Nephrolepis cordifolia, Pteridium aquilinum, Pyrrosia lingua, Odontosoria chinensis, Arachniodes sporadosora, Lindsaea orbiculata, Lygodium japonicum, Lepisorus thunbergianus, Osmunda japonica,* with *Cyathea lepifera* and *C. spinulosa* forming a romantic frame to some of the wonderful views.

Saturday November 9 Yuwandake Mountain, Roadside Stop and Materia Falls Pat Acock

Fig. 11. The group before setting off up Yuwandaki Mountain.

Photo: Kazuo Tsuchiya

Expectation was high today as we were to visit Yuwandake Mountain, reckoned to be the *pièce de résistance* of the whole tour, and so it would turn out to be. The coach journey took nearly two hours through breath-taking scenery and views of the Japan Sea below. Armed with our lunches and plenty of water we reached the car park at the foot of the trail (28°17'15″N, 129°18'56.1″E), which surprisingly was not so well-trodden for such a beautiful place.

At the very entrance of the forest, as if enticing us in, was a huge *Asplenium antiquum* welcoming us into the treasure house that was to follow. I counted over 40 ferns in my records and, having to fight my way forward to listen to Mr. Yamazumi, I must have missed almost as many again, since when I made it to the front I soon lost my place when taking pictures of all the diagnostic features of the newest fern in view and had to fight my way to the front all over again.

Fig. 12. Dan Yansura and Paul Ripley picture the climbing *Trichomanes auriculata* in the cloud forest of Yuwandaki Mountain.

Photo: Pat Acock

Among the newer ferns we saw *Blechnopsis orientalis, Arachniodes sporadosora, A. amabilis, A. yakusimensis, Lindsaea javanensis, Diplopterigium glaucum, Plagiogyria adnata* var. *yakushimensis* and *Diplazium pullingeri.*

Foolishly I thought I had found an *Arthropteris* climbing up a tree, only to be told it was *Vandenboschia auriculate*. We were now much higher and the more common ferns lower down were being replaced by *Dryopteris koidzumiana, Thelypteris cystopteroides, Vittaria flexuosa* and *Elaphoglossum yoshinagae*. In the trees we saw *Goniophlebium niponicum, Asplenium wilfordii* and *Davallia mariesii.* We stopped for lunch and right under our picnic tables, down the hill a little, we could see right into the crown of *Cyathea podophylla.* Before the slow could finish their lunch, Mr. Yamazumi appeared from the forest with three ploidy levels of *Deparia petersenii.* These were the allotetraploid/autotetraploid, depending on how you classify its two diploid parents, a diminutive hexaploid and the apomictic pentaploid hybrid.

On our way down we saw *Thelypteris triphyllum*, a small beauty, *Loxogramme salicifolia,* and *Diplazium fauriei.*

We now drove around the mountain's contours to the NW side and on a wayside stop on the road, (28°18'47.0″N, 129°20'13.8″E) we were shown of special interest *Botrychium virginianum* and another *Cyathea podophylla.* With all that good tuition, on being allowed to wander freely along the road I found I could name all the twenty ferns along the banks apart from one that Mr. Yamazumi told me was *Thelypteris glanduligera.*

Fig. 13. Mr Yamasumi shows the size difference of the higher ploidy levels of *Deparia petersenii*. The hexaploid is to the right followed by the apomictic pentaploid and the tetraploid.

Picture Pat Acock

We then called in for a brief stop at the Materia Falls (28°19'03.7″N, 129°21'06.2″E). Unfortunately, seeing a photogenic colony of *Cheirpleuria integrifolia* I was far back again and with the constant recording I was one of the last to the falls.

We saw a simply splendid *Angiopteris lygodiifolia* and all three *Lindsaea* taxa we had been introduced to in Amami. Especially special to me at this twelfth hour of the tour, I also discovered all three taxa in the *Deparia petersenii* that we had seen at the top of Yuwandake Mountain earlier in the day, on the rough ground at the foot of the falls. Forcing in one last site I rushed away to above the Falls where Daniel Mount had told me there were a number of large colonies of *Cheirpleuria integrifolia*.

Conclusion Alice Taylor

I would like to thank Kazuo, Yamazumi-san and Asher for organising, guiding and translating on this unique tour. Thanks also to all the wonderful participants who welcomed me so warmly into their familiar group from across America but especially to Pat, Paul and Lindsay from the BPS. And, last but not least, thank you to the British Pteridological Society for their generous grant which contributed to my being able to attend this tour as a working horticulturist in London.

For me, visiting new and less visited parts of Japan like the Shikoku and the Amami Islands was wonderful as each Japanese island has its own unique story and feel which we came to learn of through our different outings and the guides and other people we met along the way. This experience of seeing these plants together with so many enthusiasts and fern specialists was an invaluable learning experience which I will share with colleagues and students at Kew and beyond. I have left with a better insight and improved knowledge of ferns in general, their preferred growing environments and how diverse Japanese ferns really are. The tour really was an unforgettable experience and I will strongly encourage others fern lovers to attend if there is another in the future.

Fig. 14. Lunch on Yuwandaki Mountain; the fourth of our treeferns, *Cyathea podophylla* just obscured by Pat and Paul growing in the drop behind the raised platform.

Photo: Kazuo Tsuchiya

On a sadder note, the absence of Tim Pyner was deeply felt by everyone on the tour, as he had been on the two previous tours and was, I am told, a font of knowledge and wisdom, not only on the ferns but also on most other aspects of the flora. His photographic memory, especially for the ferns, was a considerable help when lesser mortals failed to recognise ferns they had seen previously, even perhaps the day before. I met him a few years ago when I was a relatively new to my role looking after the tropical and temperate fern collection at Kew. Everyone on the tour had him in their thoughts throughout, when recalling memories from past tours, when pointing out ferns he would have liked to have seen, when toasting after the delicious meals we shared, but especially in the quiet moments in the beautiful places we visited.

Dryopteris filix-mas 'Bollandiae' - a Mystery Fern

Martin Rickard

I have long admired this cultivar of male fern as one of the most interesting cultivars of any *Dryopteris*. It is generally considered to be the plumose form of *D. filix-mas*. It does spore but the spores never or only rarely germinate. I have never succeeded in raising progeny. Unfortunately it is always depauperate, not to such an extent that it is not worth growing but close examination usually reveals missing pinnules, or missing pinnae. In time it makes a grand bushy fern with three-foot-long fronds.

I first saw it in Kew Gardens where it was a large plant in the 1970s, a survivor of the great collections given to Kew at the end of the 19th century. At the time I knew of no other plant, but tracking down the garden of a former member in Shropshire, Rev. Sergeantson in Acton Burnell, I was astonished to see a huge plant by the front door of his former home, again in the 1970s. Sergeantson was a member from at least 1911 to 1915. He may have been a member before 1911. The plant was still flourishing at Kew the last time I was there and I've no doubt the Shropshire plant will still be in fine fettle, unless subsequent owners have tired of it.

I mention the Kew and Shropshire plants as evidence of the robust longevity shown by this cultivar. It is an excellent garden plant but always rare in trade because it is only reliably propagated vegetatively. However, this should not be a problem; it soon forms an easily dividable rootstock (see Fig. 2). Furthermore, dead looking lengths of caudices will often produce plants from the old leaf bases, much as in *Asplenium scolopendrium*.

Fig. 1. *Dryopteris filix-mas* 'Bollandiae'. Top half of frond at Kyre in 2011. Note the slight depauperation, with odd pinnules and pinnae damaged or missing. Many fronds are far more deformed than this, but also notice the delicate lobing of the pinnae and the glossy surface of the frond

'Bollandiae' was found in Kent by a Mrs Bolland in 1857. Col. A.M. Jones, in his *Nature Printed British Ferns* 1877, shows a fine frond. He comments that it was the only known plumose form of *D. filix-mas* (and still is in 2020). Unfortunately he does not say where in Kent it was found. All we know is Mrs Bolland found it growing in a hedge entirely apart from other ferns. It was a single plant and has never been found again. I have a feeling in the back of my mind that I have somewhere seen reference to it being found near Tunbridge Wells, but this might be wishful thinking.

Fig.2. *Dryopteris filix-mas* 'Bollandiae' at Kyre 24.5.20. Ten days after devastating frost killed all emerging fronds. The second crop now emerging are already showing depauperations. Note the rootstock about 1 foot across with many, many crowns.

Many years ago I showed my plant of 'Bollandiae' to Christopher Fraser-Jenkins (see my *Plantfinder's Guide to Garden Ferns*, 2000). Once he heard it was from Kent, he surmised it could be a hybrid between *D. filix-mas* and *D. aemula*, both of which occur in the Wealds of Kent and Sussex. Such a thought had never occurred to me but I could see that given the location, albeit only 'Kent', and with the intermediate morphology it was an outside possibility. Add in sterility, and robust growth, suggesting hybrid vigour, the idea was beginning to look rather attractive. Sadly, in the 20 years since I published Christopher's suggestion, I have not heard any evidence to disprove or support the theory. Perhaps referring to Christopher's supposition in a horticultural book meant no scientist noticed it?

To make the supposition less likely the only other hybrid involving *D. aemula*, *Dryopteris* × *pseudoabbreviata*, (*D. oreades* × *D. aemula*), died after 10 years in cultivation; sadly no divisions were taken. It, too, was only found once as a single plant. Sadly it is extinct, not a fate likely to befall *Dryopteris filix-mas* ' Bollandiae'.....!

The Fern Leaved Beech

Pat Acock

One of the 3 most beautiful trees in the Bromley area is the Fern Leaved Beech, which is situated in the corner of the cemetery in St Mary Cray but 200yds from our house. Martin also had one in the gardens of his old house/mansion in Kyre Park. If you ever saw one of his Chelsea Flower show displays you would know that he used to collect many sacks full of the leaves as they fell and would disguise the pots on his fern stand by covering them with the dried leaves of this tree. I wonder how many people noticed this or just thought they were leaves!

Fig. 1. The magnificent Fern Leaved Beech just inside the entrance of Hagley Park, Christchurch

On visiting the Botanic Gardens in Hagley Park, Christchurch, New Zealand a few years ago to my great surprise they had one as well. Its more formal name is *Fagus sylvaticum* 'Asplenifolia'

Growing in the subtropics certainly gives it a boost and it is certainly a very fine specimen. Having visited again this year, I took the opportunity of taking a few photographs of it to show its outstanding nature as well as a few details.

Fig. 2. Details of the leaves of the Fern Leaved Beech.

I hadn't realised that this tree is a chimaera. In this plant the grafting of the incised form is on the natural one and the incised form grows like a skin over the ordinary beech of the root stock. Any damage to the branches usually results in the ordinary beech growing out of the damaged stem. I did not know this at the time and would have looked for ordinary beech leaves and photographed them as well. Still there is always next year!

Fig. 3. Details of the Fern Leaved Beech mast

Fig. 4. Details of the leaves of the European Birch, *Fagus silvatica*

Interactive Responses of *Adiantum* Life-cycle Turnover to Limestone Rock Tufa Formation

Christopher N. Page

Collective images at differing scales and points on the colonisation and entombment of Adiantum capillus-veneris at the locality discussed in the text, showing some of the many various stages in its dynamic colonisation and tufa-forming cycles

Part of my ongoing studies of the use of ferns as biomonitors of change is to look closely at bio-dynamics of unusual occurrences of ferns in relation to active environmental factors around them. Ferns are often particularly sensitive to such factors, but this has been remarkably little explored. In this article I describe a location where *Adiantum* ferns and geology are closely interrelated, in a dynamic continuum of repeating events.

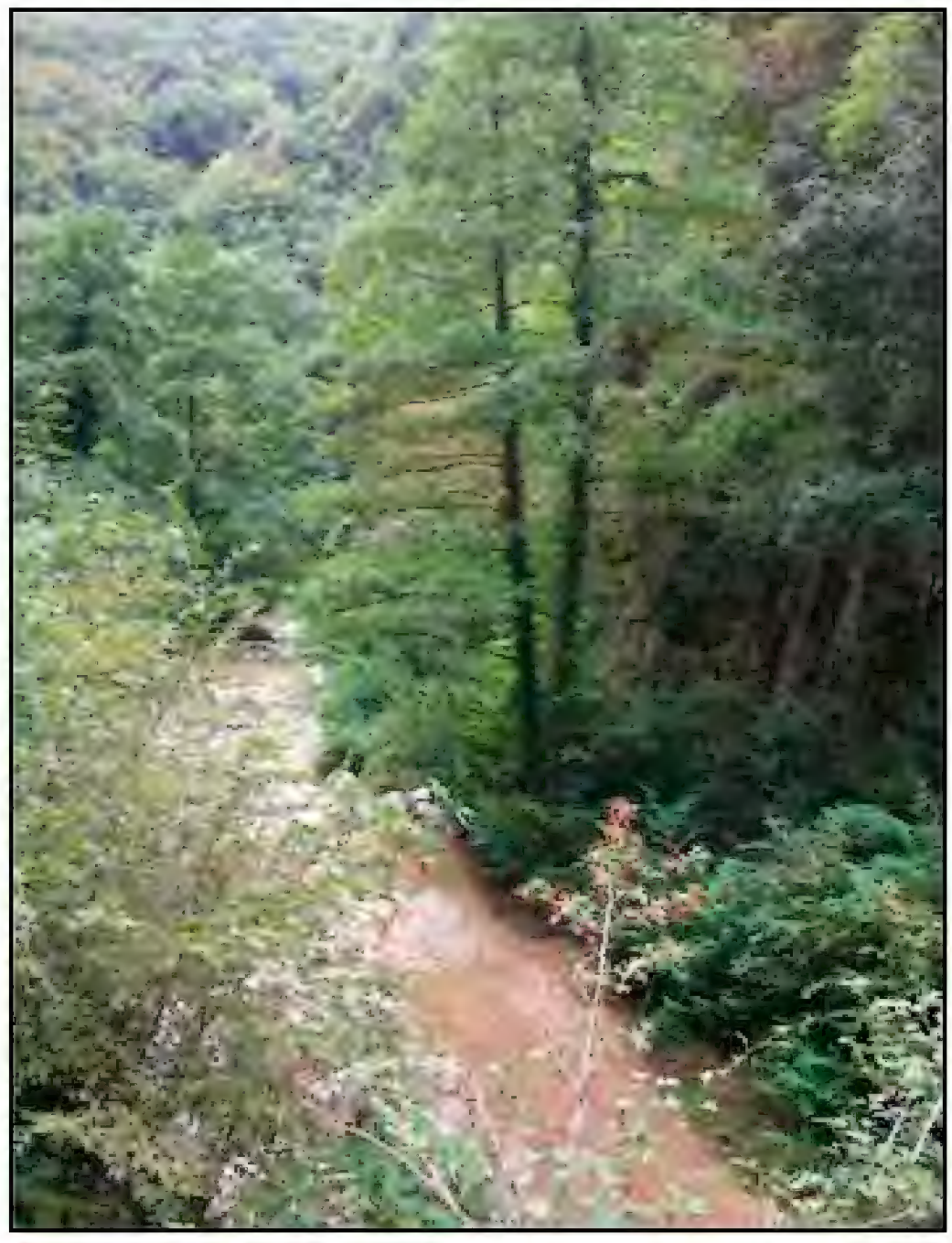
One reason, I am informed, why plants are so little taught in universities today is that plants are regarded as behaving too slowly to fit in to busy teaching schedules. If plants are slow, then geology is normally far slower. It is thus interesting to find a situation involving a fern in which the ecology of life-cycle events of the fern itself takes place at a speed that processes of geology are able to closely match, the two thus following a mutually interactive bio-geo-dynamic pathway.

The fern concerned is *Adiantum capillus-veneris*. The interactive pathway is one occurring where lime-rich freshwater as springs and seepage lines emerges repeatedly in steep limestone cliffs. The out-flowing springwater is itself laden with lime, and the result is continuous formation of a *de novo* rock accumulation. This occurs in the form of calcareous tufa, on to, over, and around, the relatively wiry structure (especially of the rhizomes, stipes and rachides) of the *Adiantum* plants. The *Adiantum* plants themselves repeatedly recover from encrustation around and upon them by producing new growth or new colonists on top of newly-formed tufa. This process is probably common but local. This example of this inter-relationship is not just of a geo-chemical interaction with one plant, but with a population of plants forming more or less continuous growth across a wet cliff-face of the order of 50m of near-vertical rock-face, covered by whole "curtain" of *Adiantum* plants. These *Adiantum* plants covering this rock face must number many tens of thousands of individuals, and form a continuous mosaic of older and younger individuals in a state of overall dynamic equilibrium with the active depositionary geological processes occurring constantly beneath and around them, which they themselves in turn help to provide a framework to achieve.

Tufa itself is a rock formed from redeposition of calcite when hydrogencarbonate-rich waters lose carbon dioxide, often as a result of removal by plants. It slowly builds a relatively porous, semi-friable mass of partly trabeculate structure (Pedley 1990).

I found this habitat while exploring a ravine of a river draining part of the southern flank of the Alps, at about 1750m altitude, in Northern Italy (I do not intend to be too locationally exact, as it is never good for the plant, especially when you are recording it!).

There may well be many other sites like it. The river here, which clearly becomes a torrent at wetter times of the year, has cut a narrow ravine down through densely-bedded Mesozoic limestone rocks, in places 100+ metres in depth.



The limestone rock in the exposure contains very many small fissures, amongst which are numerous active seepage and spring lines. At the time of my exploration (late summer) most were active sources of free water, so are likely to be ones which run year-round. The rock is partly sheltered by broad-leaved trees along the stream margins in its lower parts, but more directly exposed and free of most other vegetation over vast areas of cliff higher up.

Across the whole cliff face are very many plants of *Adiantum*, forming a patchwork-like continuous mosaic of plants of differing ages, with ones of progressively younger age clustered around each spring.

Water emerging from each spring and seepage-source filters through the *Adiantum* plants around, which become constantly entombed in calcareous deposits; these recurrently and rapidly build through any moss layers present and through the *Adiantum* plants themselves. The ferns also grow far more rapidly than any mosses, which tend to become entirely entombed, while the fern responds instead by constantly regenerating on all fresh new tufa surfaces built each season, through what appear to be mixture of recovery from entombed rhizome fragments and especially through additional profuse fresh prothallial growth on fresh tufa surface, from spores arising most likely from fronds of more mature plants in more sedentary parts of the fern-frond sward around.

Although it is becoming increasingly appreciated that formation of tufa ideally requires some bio-framework upon which to build ("biomediation" *sensu* Pedley et al 2009), I am not aware of any previous indication by geologists of any fern ever being known to have an involvement in this process, nor to the extent that this site reveals that this can take place on a sustained and recurrent basis. (As the fern itself forms the basis of the framework for this tufa type to build, I suggest its consequence could adopt the rock-type name "*Pteridotufa*").

The recurrent dynamics of the process as seen at this site are best appreciated from a selection of photographs. Pictures of the fern at different stages of entombment and annual recovery and recolonisation are not necessarily the most beautiful of the plant, but that's not the point. They show a dynamic situation in which the fern and recurrent geological process are each inter-related. They better illustrate the abundance of the *Adiantum*, and the role it is playing in forming a structure on to which tufa deposition is stimulated to repeatedly and actively recur, and how the fern itself recovers to repeat the process recurrently. It is a particularly rapid process, both in botanical and geological terms. In the recurrence of this process, the fern fronds never mature, but provide the unusual framework for the tufa to accumulate around, fix, form and build. For any fern, this seems to be a first!

Acknowledgements

I am grateful for comments from Dr Heather McHaffie and Professor I.I. Gureyeva.

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Notes from the Archive - Charles Druery's Press Clippings, Part 1, 1882-1900

Michael Hayward

Charles Thomas Druery, 1843-1917, a Londoner, was invited to join the Northern Pteridological Society soon after its foundation in 1891. He was a prolific author, already well known for his writing on ferns, and he was to be have a considerable influence on the development of our Society, editing and writing for the *British Fern Gazette*, and serving as both secretary and as president.

One of the treasures of the BPS archive is a set of eight large volumes of press clippings, assembled by Druery between 1882 and 1911, each stuffed with cuttings from his magazine and newspaper articles, his frequent letters to editors, articles by other authors on ferns, articles on advances in science and numerous offprints of articles by himself and by others. Each volume has a detailed index. Most of the cuttings have been dated by Druery, but the magazine or newspaper from which they have been taken is not always apparent.

Reading through these volumes reveals that Druery was a man of enormous energy and very wide interests, always working to spread to others his knowledge of ferns and love of science. He spoke five languages, travelled widely, and was in demand as a professional translator. On a lighter note, he encompassed light entertainment, writing books of humorous poems, in the style of Thomas Hood, and recitations, suitable for young men to declaim at family soirees. In his obituary F. W. Stansfield describes Druery as *'a brilliant conversationalist, with an unfailing fund of wit and humour. His jokes and puns were incessant, and from their very abundance, were occasionally atrocious but always ingenious and occasionally brilliant'.* (*British Fern Gazette*, September 1917).

Around three quarters of the material in the 850 or so pages of the cuttings books is Druery's own, much of which is frequently re-used and modified over time. He wrote for numerous Magazines, Newspapers and Society Proceedings, and he contributed chapters to books. These notes from the archive (which will be presented serialised!) describe some of the more interesting (to me) material in the eight volumes, and I hope that these selections will show the vast range of his interests and activities. Although he was a regular contributor to Willard Clute's *Fern Bulletin*, there are few cuttings from this North American journal or from his contributions to *The American Fern Journal.*

It is difficult to ascertain Druery's precise occupation through his career. In the Census records of 1871 he describes himself as a commercial clerk, Colonial import. Neither he nor his wife Elizabeth are listed in 1881. In 1891 he lists himself as a 'Financial and Insurance agent', and in 1901 as 'Company secretary, translator and journalist'. He was now the secretary of a company with interests in gold mines. He had a number of business addresses in the City of London, including 17 Gracechurch Street (1894), Moorgate Station Chambers (1899) and 16 Philpot Lane (1903). His home after his marriage in 1873 was in Windsor Road, Forest Gate, then in Shaa Road, Acton.

Volume 1, 1882-1892

This and succeeding volumes contain numerous clippings of the press reports of the early meetings of our society. In one of five reports of the 2nd (1892) meeting, signed CTD, he persists with the original title of *'The Northern British Pteridological Society'*, despite the change of name at the meeting!

There are in all the press clippings volumes very many articles on British ferns. In this volume are numerous reports and discussions of his finding of the phenomenon of apospory in *Athyrium felix-femina* Clarissima and offprints of his papers on the subject to The Linnean Society and to the Bristol Naturalists' Society, both in 1885.

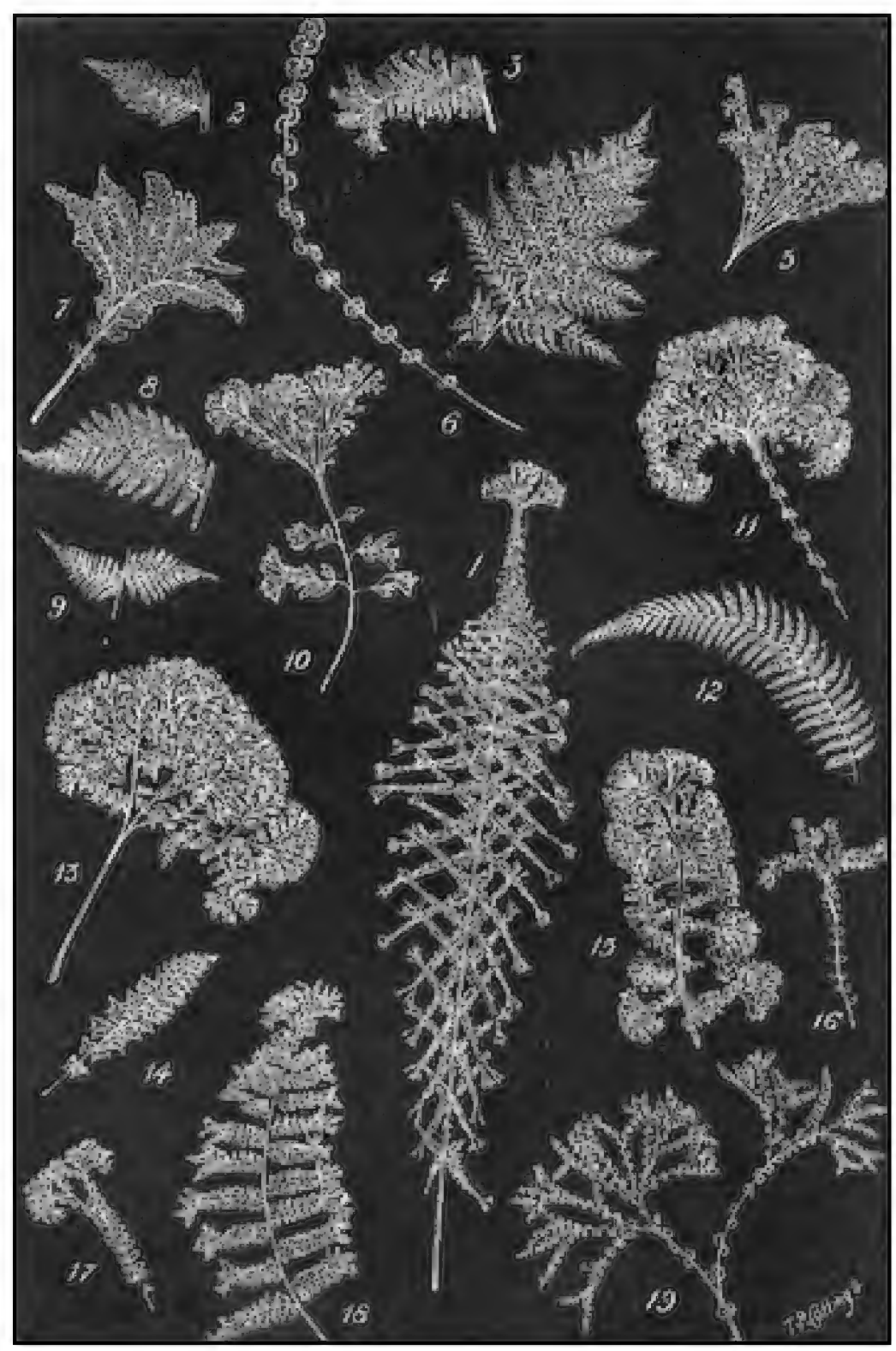

Fig. 1. One of the series of plates that Druery commissioned for his first book on ferns, British Ferns and their Varieties (1888), re-used in an article in The Bazaar – Exchange & Mart (1890), and later in The British Fern Gazette. (1910 onwards)

A review of his first book on ferns, *British Ferns and their Varieties*, published in 1888, states that he was attempting *'to revive and quicken the interest in British Ferns'.* Two years later he reused the plates from this book in a series of articles on British ferns in *The Bazaar, Exchange and Mart* (Fig. 1). His third use of these plates

was ten years later, as frontispieces for issues of the *British Fern Gazette*, which he was editing and largely composing.

In an interesting article spread over four issues of *The Gardeners' Magazine* from July 1890, Druery describes the collection of British ferns at Kew Gardens (Figs. 2 & 3). The plants in this collection had been donated by Col. Jones, Edwyn Fox, Edward Lowe, and William Carbonell, prominent fern growers who had been members of the first BPS in the 1870s. They had persuaded Kew that there should be a permanent national collection of British ferns in the Botanic Gardens. But, like so many collections held by Institutions, as the interests of curators changed over time and horticultural fashions changed, the collection was gradually lost. It now takes a considerable effort to find any good specimens of British fern varieties in the gardens. The photographs give an idea of the extent of the Kew collection in its heyday.

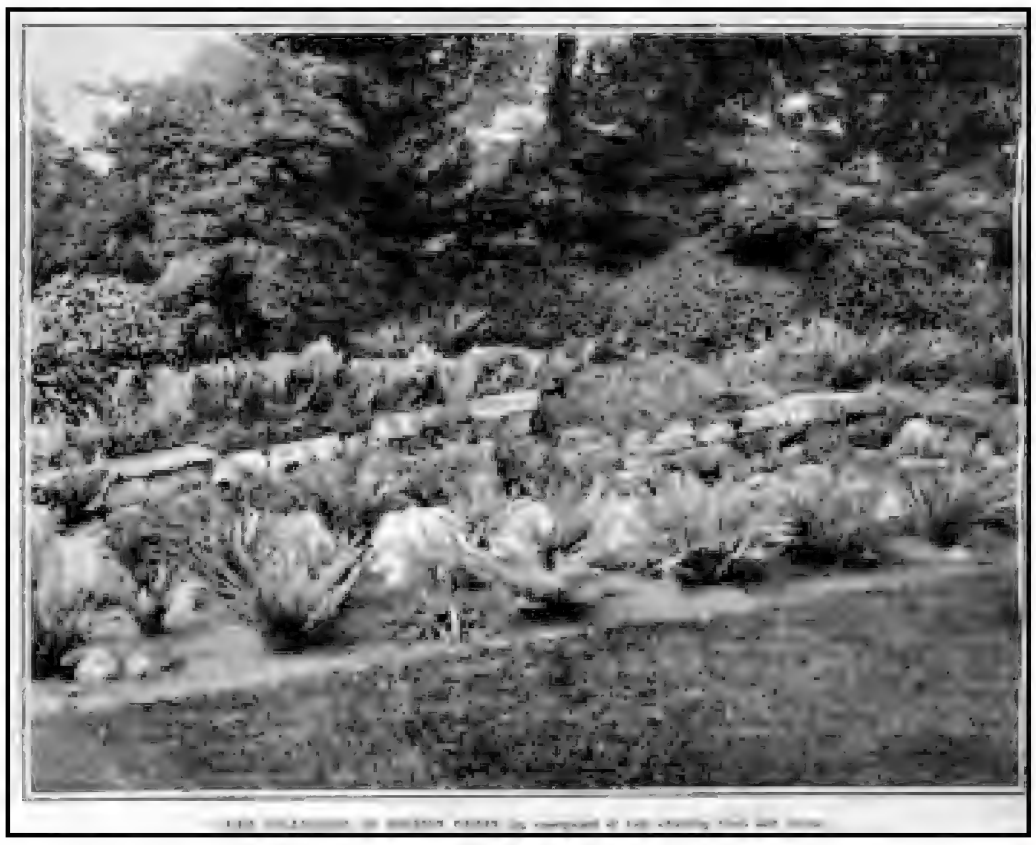

Fig. 2. The Kew collection of British Ferns.
The Gardeners' Magazine, 1890.

Fig. 3. The Kew collection of British Ferns.
The Gardeners' Magazine, 1890

In July 1889 Druery narrates in the *Journal of Horticulture* a long travelogue of a visit that he made to Northern Mexico, reached by a four-day train journey from New York. He describes the scenery, the people, the flora and fauna, without concentrating on the ferns. Amongst the hazards of his botanising were encountering a rattlesnake amongst the *Cheilanthes.* His companion shot the snake through the head. On a trip of 70 miles they had to ford 156 rivers. After three months, he returned to New York via Texas, where local children sold him a specimen of the *'Resurrection plant' Selaginella lepidophylla*, which he demonstrated to various meetings after his return home. A second account of his explorations is recorded in the *Gardeners' Chronicle*, June 1890. Druery does not discuss the reason for his Mexican trip in these two articles, the explanation for this hazardous adventure, where his life was threatened several times, coming in a later article.

His general science writing includes a series of long leading articles written for the monthly house magazine of a wholesale pharmacist, Corbyn, Stacey & Co, to which he has added his initials. Each leader is a discussion of some recent advance in science, taken from the British or European literature.

Towards the end of this volume is an 1891 account in the *Gardeners' Chronicle* of Druery's glasshouse. This article was later recycled as a chapter on ferns in *The Century Book of Gardening*, a Country Life publication. the same photograph of his fernery being used each time (Fig. 4*).* His fernery was 14ft x 18ft and he writes that all the ferns were British, apart from *Woodwardia radicans* at the far end. He had no heating in the fernery at the time the article was written.

Fig. 4. Charles Druery's Fernery, an unheated conservatory, 14ft x 18ft.
Gardeners' Magazine (189)1 and The Century Book of Gardening.

Volume 2, 1892-1897

From Volume 2 onwards, the press cuttings books are increasingly stuffed with multiple overlapping items per page. All of these early printed booklets of the papers presented at BPS meetings are included. They have been reproduced in the BPS special publication No 5, *Abstracts of Reports and Papers Read at Meetings, 1894-1905.*

Another travelogue, of a two-month trip to Smyrna in Turkey, was written for the *Gardeners' Chronicle*, with a slightly different version published in *The Chemist's Annual List* of another pharmacist, Sanger & Son. His articles describe the countryside, the buildings, the flora and the people, but there is very little about ferns.

Druery continued to produce multiple articles on British ferns, fern collecting, and fern growing. New topics include raising scolopendria from frond bases, growing filmy ferns in a Wardian case and finding and dealing with vine weevil (*Otorhincus sulcatus)* attacking the pots of scolopendria in his fernery.

Articles of a more general nature include a discussion of the possibilities of growing maize as a commercial crop in Britain. Druery was a founder member of the London based Horticultural Club, and accounts of all of its meetings are included in the volumes.

Druery was quick to comment on matters that he did not approve of, either by letters to editors or by short articles. In two brief articles in *The Gardeners' Magazine* (1895) he took *The Royal Botanic Society* to task for its failure to make any contribution to botany. The society was an exclusive London member's club, founded in 1839, which had an eighteen-acre garden in the centre of Regent's Park. A very fashionable flower show was held in mid-summer. Druery writes that the gardens *'have as much to do with practical botany as the man on the moon'.* Proposals, in 1895, that members of the public should be admitted to the gardens two days a week, on payment of one shilling, caused a group of the aristocratic founder-members to threaten to resign. The society survived until 1932, when its lease was revoked, and the site is now Queen Mary's Garden.

E. J. Lowe, an enthusiastic crosser of ferns, had become convinced that by sowing a mixture of spores, he could produce sporelings with the character of up to four parents. This led to the publication of Lowe's last book, *Fern Growing (1895).* In an article on 'multiple parentage', Druery very diplomatically explains why the majority of scientists disagreed with Lowe's conclusions. He clashed with Lowe on a number of occasions.

In March 1898 Druery wrote an article in *The Gardeners' Magazine* under the title *A Hobby for Ladies.* The article commences *'In the Autumn or late Summer, when the termini of the metropolis are crowded with returning tourists, male and female, who have been revelling in the rural delights of our coast or inland resorts, the observant eye cannot fail to be struck by the enormous number of ferns which, in baskets and bundles, figure among the impedimenta, and mainly those of ladies. On enquiry, we shall find that the bulk of these are self-acquired spoils of the so-called fern-hunting expeditions, while the rest will be simple purchases from hawkers, who have saved them the trouble... '* He then goes on to comment that the majority of these ferns will have a very short life, and to advise his readers to purchase good ferns from reputable dealers; he also gives his advice on planting and caring for ferns. E. J. Lowe had written a newspaper article advising ladies to fill their gardens with ferns purchased from street hawkers. Druery took him to task for this suggesting, writing a long letter in the vein of this article.

The first example of his more light hearted writing is recorded in this volume, six verses of a Christmas song titled *'Sir Holly and Lady Mistletoe'*, published in the *Gardeners' Chronicle*, November 30th 1895.

In *The Gardeners' Magazine*, and also in *Amateur Gardening*, Druery wrote a series of short epistles by a country bumpkin, "Willyum Grubbins", often addressed to his son Bill or to Druery, his previous employer, all written in a faux country dialect. A typical letter berates his son for adopting new ideas when his father knew that the old ways were better. This was an era when all dialects were looked down on, and made fun of, leading to Lord Reith's diktat that only BBC English should be spoken on the radio, an attitude that is now fast receding. These short epistles were apparently very popular when Druery recited them, and formed the basis of his 1899 book *'The Tatur Disees and other Essays'.* The humour in these small pieces struggles to come across in our more politically correct age, but they were readily accepted by the gardening press of the time.

Volume 3, 1897-1900

To celebrate Queen Victoria's Diamond Jubilee in 1897, the R.H.S. instituted its Victoria Medal of Honour, with 60 recipients. The *Gardeners' Chronicle* issued a supplement to commemorate the event with photographs and brief accounts of all 60 individuals. Druery, one of the recipients, carefully cut out the images and mounted them in this volume, keeping the text descriptions separate. Figure 5 shows his photograph, as it appeared

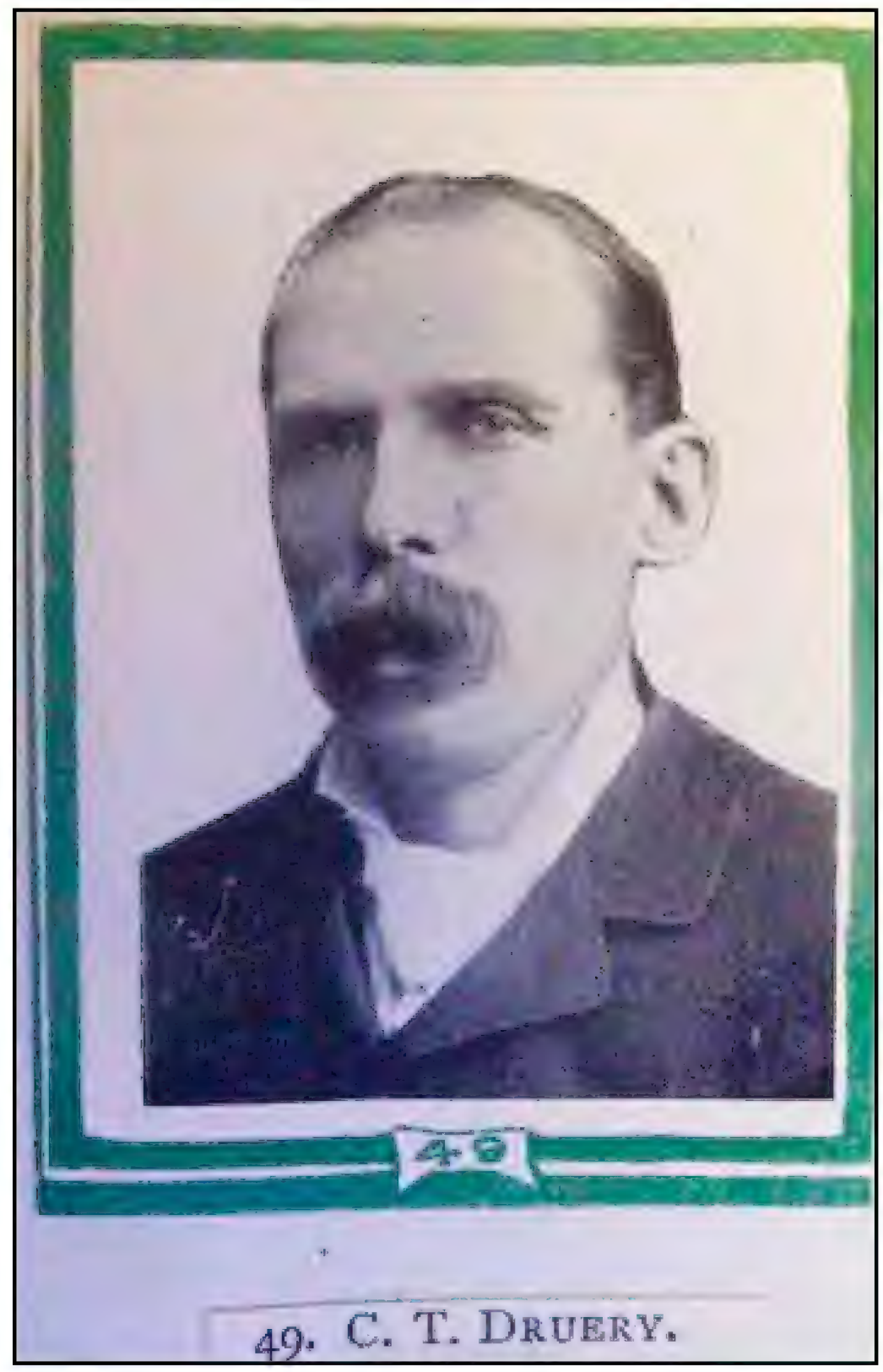

Fig. 5 Charles Druery. Taken from photographs of the 60 individuals awarded the Victoria Medal of Honour by the RHS in her diamond jubilee year, 1897. Gardeners' Chronicle Supplement

in the magazine. 58 of the recipients were male, the two female members being Gertrude Jekyll and Ellen Willmott.

Druery's popular science writing includes a series of ten weekly articles from October 1897 onwards, under the overall title of *'The Wonders of Familiar Things'*. The newspaper for which they were written is not recorded. The subjects of the articles were *'The Aerial Ocean'*, *'Clouds, Rain and Rivers'*, *'The Basis of Life'*, *'Variety and what we owe it'*,*'The Big and the Little'*, *'Jack Frost and his work'*, *'Seeds and Spores'*, *'A pinch of Dust'*, *'A Path and what Gravel leads to'* and *'A Scuttle of Coal'*. It was still common in this era for newspapers to copy whole articles, verbatim, from other publishers. Druery heads these and some succeeding popular science articles with a disclaimer *'All Rights Reserved'*, an indication of his status as a journalist.

In September 1899 he published a follow-up series of eight weekly articles in the same newspaper under the title *'Everyday Marvels'*. His subjects for this series were *'A Sunbeam'*, *'Fire'*, *'A Flash of Lightning'*, *'Waves'*, *'Terrestrial jolts'*, *'Spinning and Weaving'*, *'A Cabbage Leaf'* and *'The Moon, the Weather and the Tides'*. The articles were an expression of his passion to explain science to the uninitiated. The newspaper articles are written for adults, but he was also keen to interest and instruct young people in natural history and science. In 1900 he published a book *'The New Gulliver'* designed to make the subjects attractive to children, encouraging them to look closely at the world around them. A number of favourable reviews of the book are included in his clippings.

There are hints in 1899 that Druery was starting to get frustrated with the BPS just having a single meeting each year, always held in the Lake District. In his press report of the August 1899 meeting, Druery describes the BPS as *'This little Society of British fern lovers'*. In the following volumes there is much clearer evidence of his frustration with the early BPS.

Much of the material in the BPS archive has been either scanned or photographed, and copies are available from the archivist. The complexity and poor physical condition of the press cuttings books has prevented systematic scanning of the volumes, but the indexes of all eight volumes and a few selected articles, are immediately available. Other articles are scanned when a request for specific information is received. Requests for information are what makes the job of the archivist worthwhile, and are always welcome.

archivist@eBPS.org.uk

Mona Vale Fern House, Near Christchurch Botanic Gardens, South Island, New Zealand

Pat Acock

Many fern lovers aspire to travel to New Zealand, having heard how wonderful the ferns are, and also judging by the sales of Rosemary Koller and Sally Tripp's book on the *Ferns of the Port Hills* that I brought back last time; 20 copies were sold in two years and I have just brought back the last 6. The interest is not just among British enthusiasts; I have met people from Japan, Canada, and the United States in my recent travels who have an interest in ferns and who have either been or really want to explore this fern-rich environment. Travel is relatively easy from the Pacific Rim, with direct flights, but the distance from Great Britain has a tendency to put people off. However, it is not as arduous as some would have you believe.

If you are travelling to New Zealand via Christchurch, I would like to encourage you to visit the Fern House in Mona Vale Gardens (Fig. 1); it's a great place. It is situated about 150 yards out of Hagley Park's North-West corner and is managed by the same team. The Fern House is within the Rose Garden and is of a sturdy octagonal character. It is quite large and its austere outer structure is well disguised by the plantings in front of it.

The fernery was part of a 1906-7 Exhibition in Christchurch reflecting English gardens of the time, and it held exotic ferns from around the world. When the exhibition closed a local millionairess, Annie Townend,

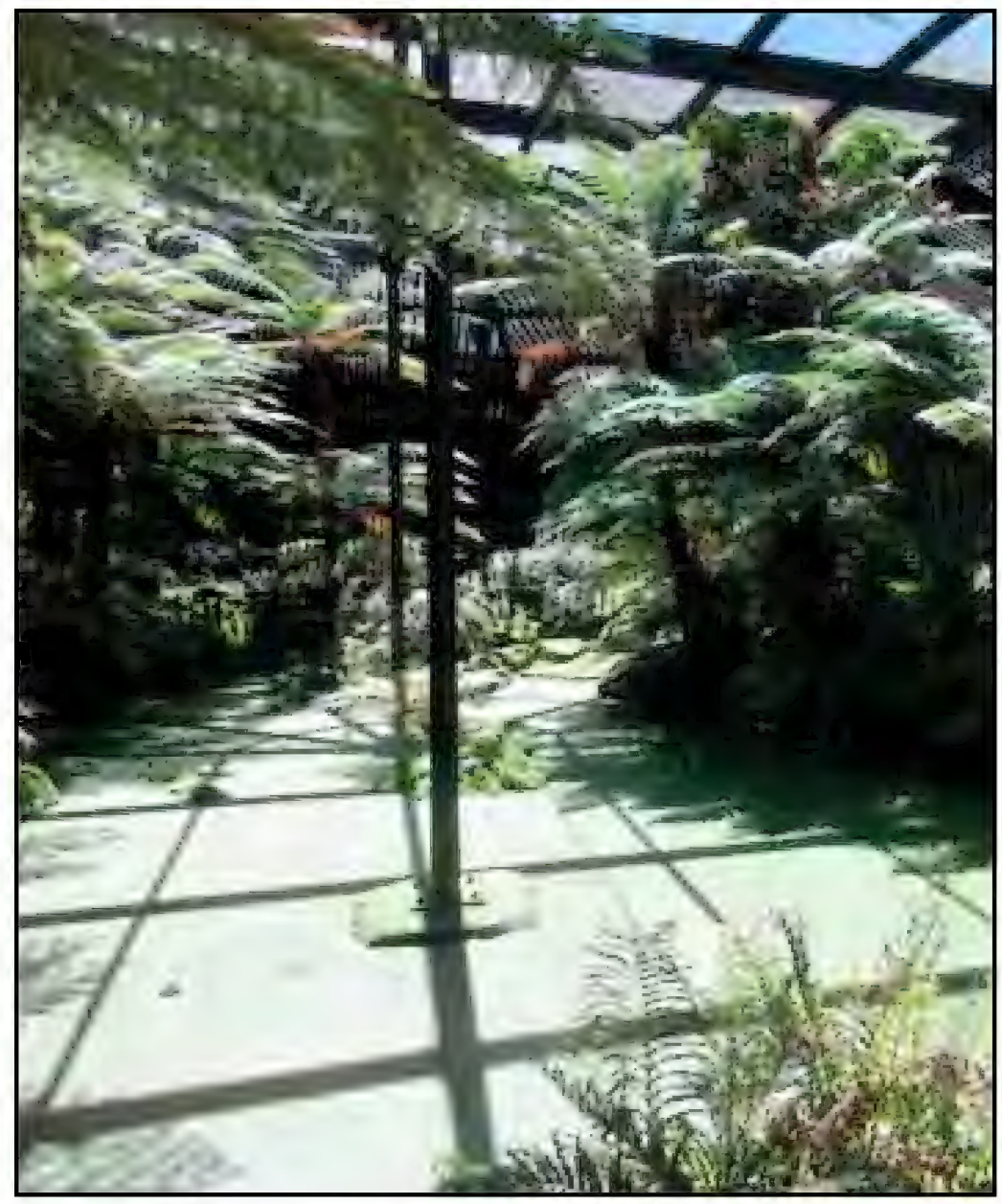

Fig. 1. Overall view of the Mona Vale Fern House

put on a new solid brick wall and planted the ferns. This added to the overall Edwardian look of her house and garden, both of which are splendidly kept up today.

I was lucky when I first visited it a couple of years after the major earthquake as it was deemed to be safe enough to enter, but the next time the powers-that-be were more cautious and I only had a glimpse from the wire fencing surrounding it. However, this time it was fully open again and I was able to visit it twice. The building is large and consists of a double brick wall with wooden struts to support the shade netting, which probably also keeps out small insects and seeds; it is fully open to the atmosphere, which probably saves watering.

Fig. 2. Overall view of the Mona Vale Fern House

There is another Fern House in the Botanic Gardens within Hagley Park; however this is poorly supervised and maintained, so it is my hope that the one in Mona Vale survives any cuts in funding. This may not be the best fern house in the world, but it is probably the best one that only contains the native ferns of a single country, namely New Zealand.

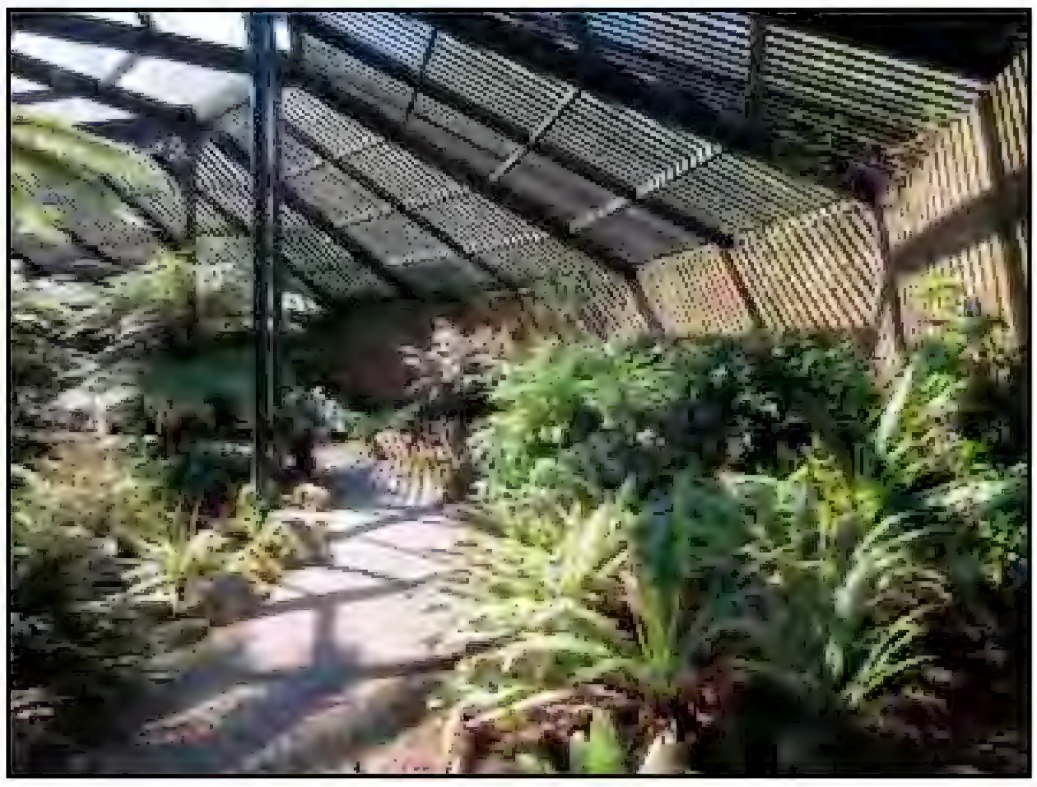

Fig. 3. Another overall view of the Mona Vale Fern House

This makes it a priceless asset for the people of New Zealand, a country that prides itself on its natural beauty and especially its ferns. Inside the house the ferns are in groups growing to their true potential and showing off their individual differences to great effect. The ferns are labelled with quality labels and, best of all, as far as I could tell the labels were all correctly-positioned by the right ferns, with only one or two missing or hidden under the luxuriant growth. The austere nature of the place is hardly noticeable inside with its wall-to-wall ferns, many taking the opportunity of colonising cracks in the walls as well as climbing up them. Tree ferns, water ferns, climbing ferns, and woodland ferns cover all the beds and spaces. The only alien fern I thought I had spotted turned out to be part of the native flora, namely *Todea barbara*.

Many of the native ferns of New Zealand are quite distinctly different. However, I have had a problem with *Hypolepis*, *Lastreopsis* and the very many blechnums, so every time I return to New Zealand and I need a little revision of both the names and the ID of the ferns, the first place I go to is the Fern House in Mona Vale, where the quiet of the place and the sight of so many ferns in one place growing so well and all correctly-labelled sets me up for the walks in this most beautiful of countries, where the people truly value their natural heritage.

Fig. 4. *Blechnum durum shows* its very characteristic fertile frond

Fig. 5. *Asplenium bulbiferum* in part of a fine stand

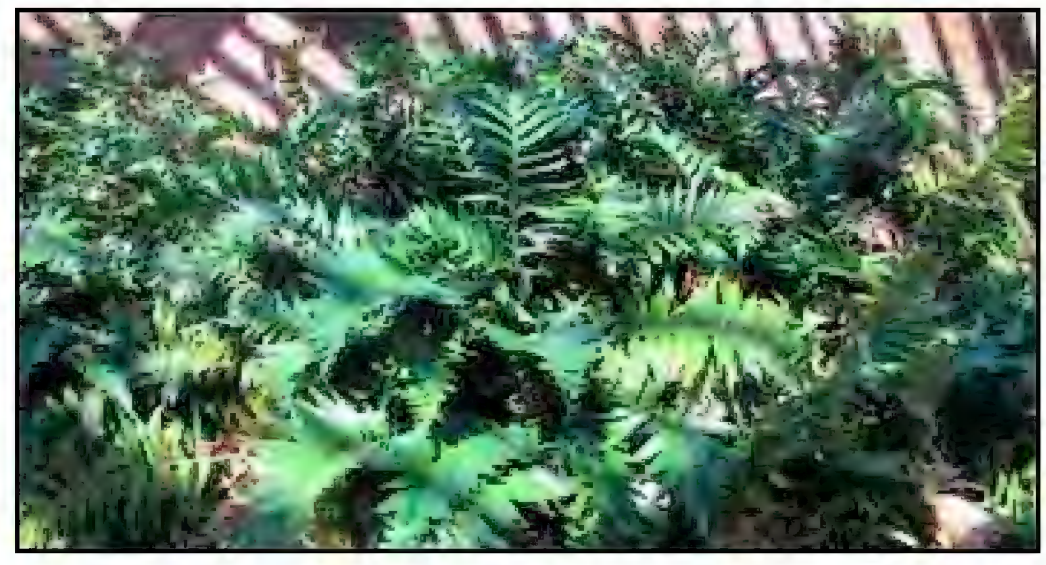

Fig. 6. *Asplenium obtusatum* grows well even away from the coast

Fronds Unfurling

Linda Greening

Fig. 1. *Dryopteris wallichiana*

Fig. 2. *Matteuccia orientalis*

Fig. 3. *Polystichum setiferum* (Plumoso-multilobum Group) 'Murray Thomson'.

Fig. 4. *Athyrium* 'Ocean's Fury'

Fig. 5.*Osmunda regalis* 'Purpurascens'

Fig. 6. *Athyrium* 'Ghost'

Fig. 7. *Polystichum setiferum* 'Multilobum Group'

Fig. 8. *Blechnum tabulare*

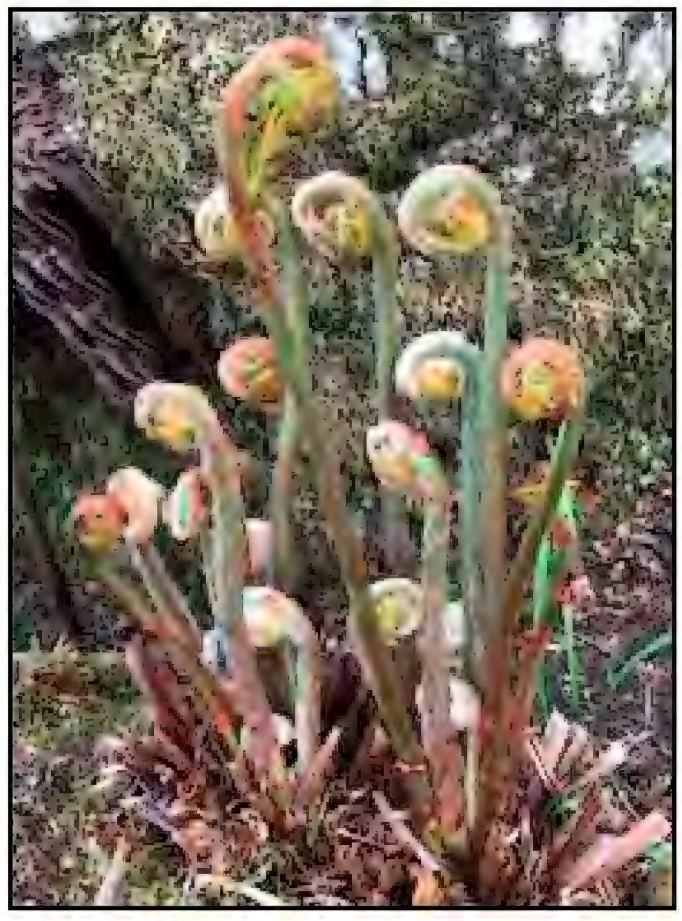

Fig. 9. *Osmunda regalis*

Charles Druery's Book Publications

Michael Hayward

Charles Druery was a prolific writer. As well as the numerous articles, on ferns and other matters, described in '*Notes from the archive* ' in this issue of the *Pteridologist* (Page 72), he published eight books, translated one from the original German, and wrote a chapter for another.

The fern books

Technical descriptions of Druery's fern books, their covers, their various issues etc, are detailed in Hall & Rickard (2006) and are not repeated here.

Choice British Ferns, Upcott Gill, London, 1888

This small book, re-issued a number of times, was well reviewed and brought Druery's name to public notice. Druery had known F. W. Stansfield since 1882 and borrowed his set of the Jones nature prints, drawings of which were used by his artist, T. P. Collings, to create seven composite plates for the book. He later re-used these plates in both the British Fern Gazette and in a series of articles in *The Bazaar, Exchange and Mart.*

The Book of British Ferns, Country Life London, 1903.

A second small book, published on behalf of the BPS by Country Life. This publication the result of Druery's attempts to stir the early BPS into greater activity. It was aimed to give readers details of only the best selections of the British ferns. The varieties included were selected by a committee of the society. This volume is the predecessor of our present series of special publications.

British Ferns and their Varieties, Routledge & Son, London, 1910.

To modern reader, this is certainly the most desirable of Druery's books, with excellent text, good illustrations and the addition of 96 plates, printed in green, from photographs of his selection of the Jones nature prints. By now, Druery had been able to acquire his own set of these prints. The set that he owned is now in the Guildhall Library in the City of London. (Hayward, 2015)

The Century Book of Gardening, ed E. T. Cook, Country Life, London, circa 1900.

Druery wrote a chapter, pp 343-370, titled *Ferns – Hardy and Exotic.* I include this because it is so different from his usual writing on ferns. The opening section on hardy ferns is in his usual style, but is followed by sections on 'greenhouse ferns', on 'stove ferns' and lastly on selaginellas. Druery was a friend of the London nurseryman H. B. May, who purchased the Birkenhead Brothers nursery in Stockport, and these sections of his chapter seems to owe a great deal to the Birkenhead/ May catalogue. Druery had no personal experience of growing 'stove ferns'; indeed he grew very few exotic ferns.

The Science Books

The New Gulliver or Travels in Athoma. Roxeburghe Press, London, 1900.

Using the device of Jonathan Swift, replacing Swift's satire with an adventure fantasy, Druery's book is designed to interest young people in natural history and science. It received favourable reviews (Fig. 1).

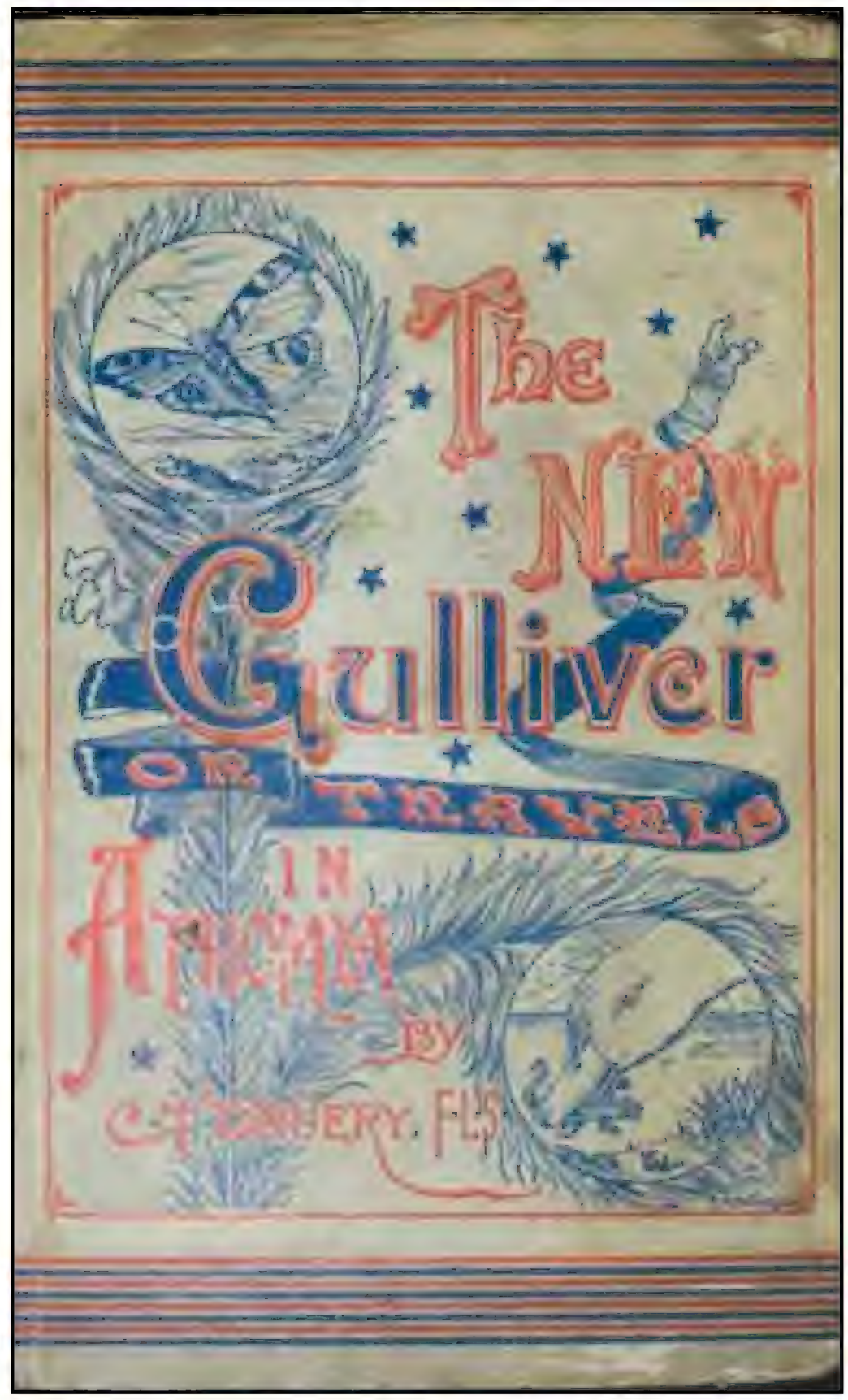

Fig. 1. Cover of The New Gulliver or Travels in Athoma by Charles Druery

The Theory of Evolution in the light of Facts, Karl Frank, translated by C. T. Druery, Kegan, Paul, Trench, Hübner & Co, London 1913.

Karl Frank, a German monk, wrote his own theory of evolution, as an alternative to Darwinism. The English translation by Druery was published in both Britain and the USA.

Poetry and humour

Versatile verses, published by the author, London, 1873.

The first of Druery's publications is a small volume, 15.5 x 13cm, neatly bound in green cloth, with all gilt edges, by Leighton, Hodge & Son (Fig. 2). The contents are chiefly relatively short poems, mostly of a humorous nature, with a number of recitations and songs as well. A taste of Druery's style can be gained from his preface to the book:-

> Dear reader, pray banish at once the idea,
>
> That the works of a wonderful poet are here.
>
> For the writer, tho' six foot high, barring a little,
>
> Is not a LONGFELLOW, no more he's LITTLE;

Fig. 2. The cover of Versatile Verses by Charles Druery

The Rocking of the Lilies and other poems, published by the author, London, 1882.

Druery's second book of verse again has a high-quality binding by the Leighton, Hodge & Son, to match his first volume (Fig. 3). It again contains many humorous recitations and poems in the style of the Victorian poet, Thomas Hood, as well as translations from the German of poems by Schiller. But the poem that gives the book its name is different again, an epic account of a year in the life of a young man courting a young Scottish woman, this time written more in the style of Longfellow. This is an autobiographical saga and he presented a specially produced copy to his wife (Fig. 4).

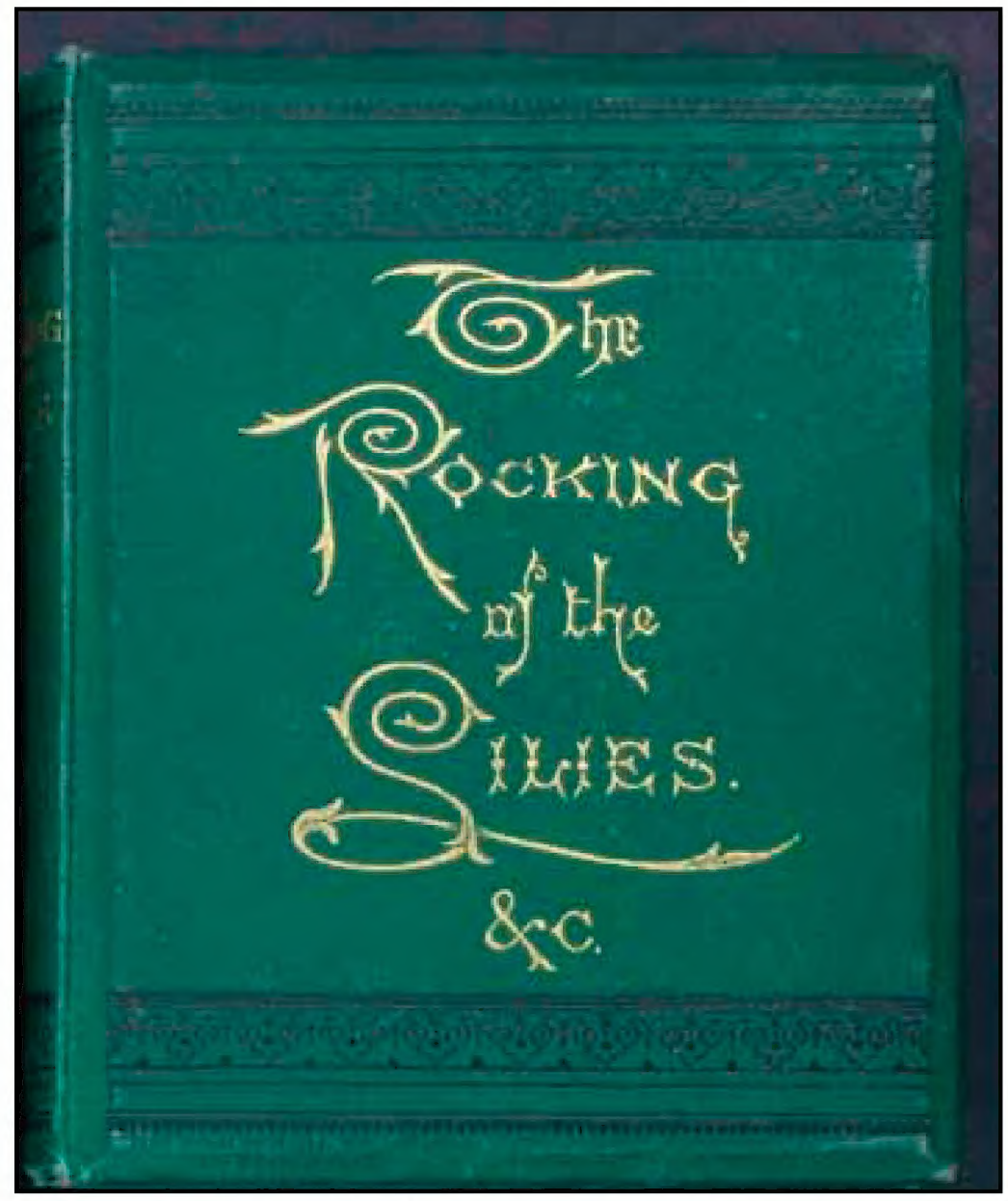

Fig. 3. The usual cover of The Rocking of the Lilies by Charles Druery

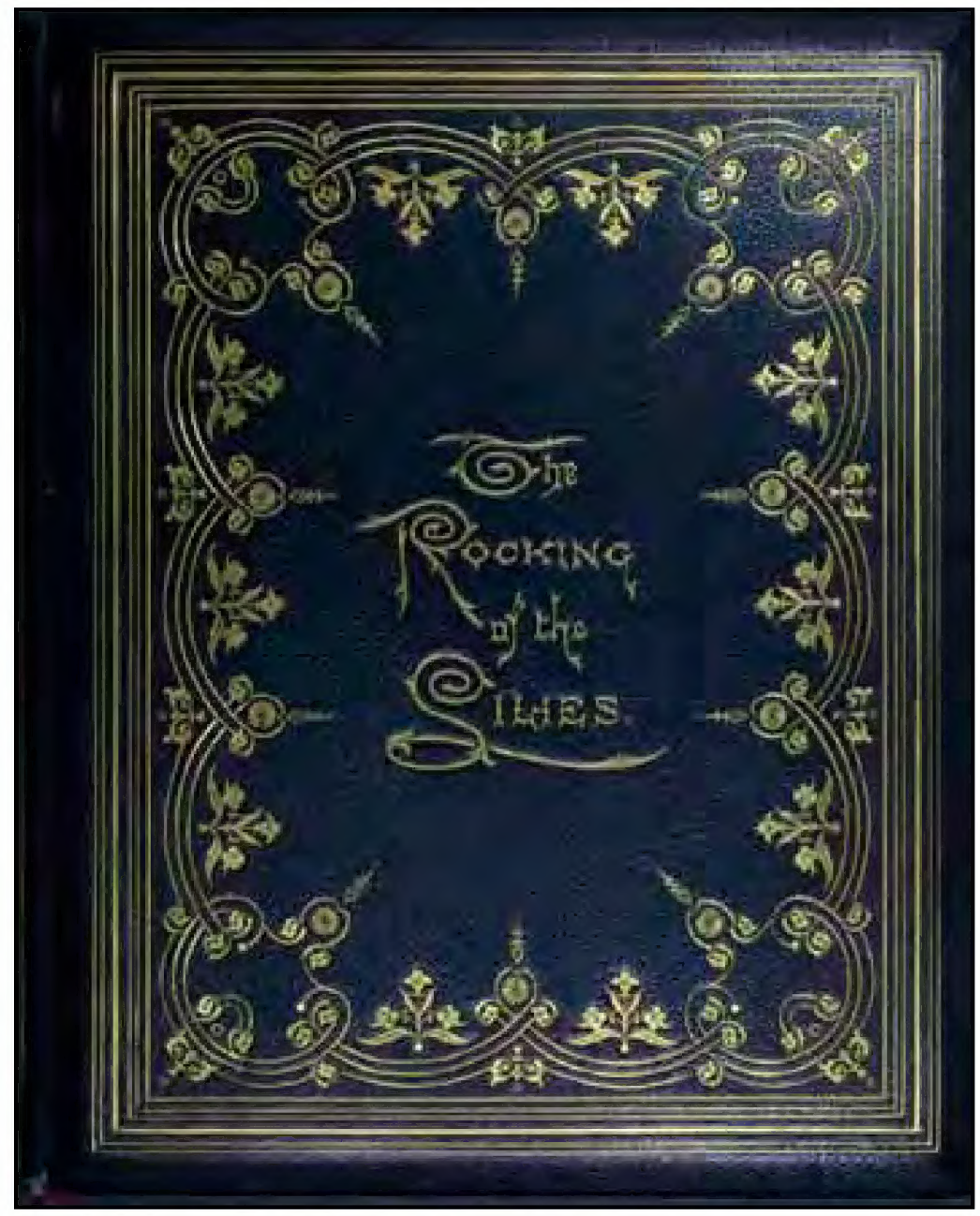

Fig. 4. Cover of the presentation volume

The Tatur Disease, published by the author, London, 1899.

Bound in red cloth, without the gilt title or gilt edges of his previous volumes. 19 x 13cm. Much of the material in this small book is derived from the many short humorous dialect epistles published in Amateur Gardening and The Gardener's Chronicle supplemented by other humorous pieces (Fig. 5).

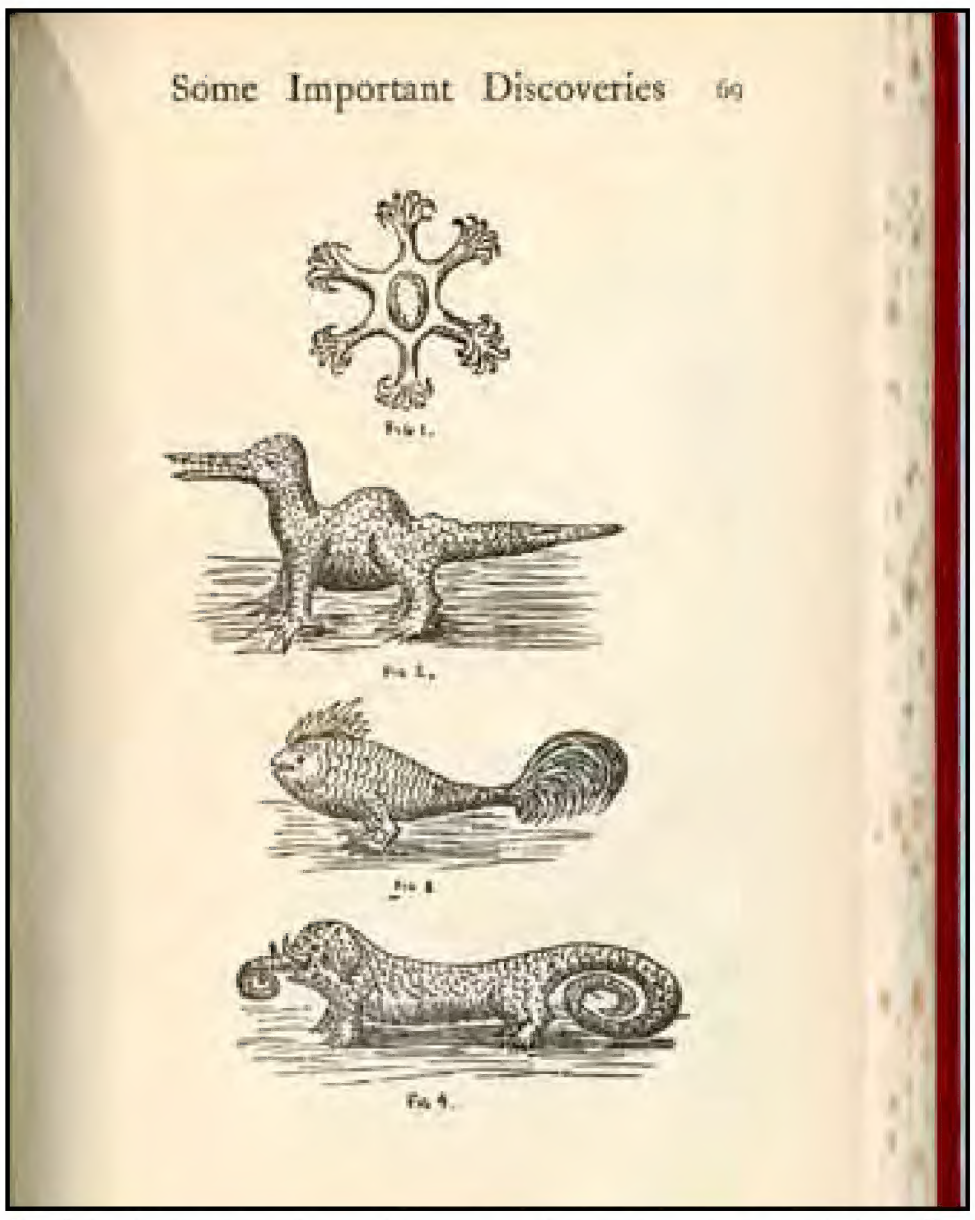

Fig. 5 An illustration of new discoveries, drawn in his own hand, from The Tatur Disees

The Pig's Tale and other Recitations, Elliott Stock, London, 1914.

Produced by a commercial publisher, bound in plain green cloth, 21 x 15cm, this book is a compilation selected from his earlier self-published books, starting with the preface from *Versatile Verses. The Pig's Tale* recitation had appeared as *'A Pig's Tale'* in his second book of poetry. Charles Druery was a great believer in re-using his material as often as possible!

A presentation volume

The Rocking of the Lilies

This is a long romantic poem describing a year in the life of a young man from London who, while on a walking holiday in Scotland, meets a young woman and falls in love. It is a story of his courtship; will she or won't she accept him. The poem was published in 1882, but was written earlier and some years ago I acquired a magnificent calligraphic volume, luxuriously bound in green morocco leather, with extensive gilt decoration and green watered silk end papers. The binder was probably Leighton, Hodge and son, but no binder's ticket is present. There are a number of photographs of Scottish scenes between the pages of calligraphy. Opposite the elaborate title page (Fig. 6) is a photograph of the young Charles Druery.

Druery inscribed the volume *'To my dear wife, Dec 25 1879'*. He had married Elizabeth Blackwood in Kilmarnock, in 1873. The saga is clearly an autobiographical poem. While it is possible that Druery himself practiced calligraphy and used his skills to create this volume, it is more likely that the calligraphic pages were produced for him by a commercial practitioner. Calligraphic services were chiefly used for the production formal documents and scrolls, such as accompanied the presentation of awards. This volume, an excellent example of Victorian calligraphy, gives a rare glimpse into Druery's private life as well as showcasing the skills of the Victorian calligrapher and the Victorian book binder (Fig. 7)

Fig. 6. Title page

Fig. 7. Sample page

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